THEATRE CATALOG

1946-47

FIFTH ANNUAL EDITION

UNITED STATES GYPSUM COMPANY

HARVEY DALEY ARCHITECT SERVICE

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THEATRE CATALOG

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ANNUAL
EDITION

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EDITORIAL FOREWORD

In any consideration of plans for the design, construction, remodeling, maintaining, or equipping of a theatre, the architect, owner, or decorator has in the past been handicapped primarily by the lack of coordinated or recorded knowledge in word and picture of the newer ideas and accepted practices established by his brother workers in neighboring or distant areas. True, there were some basic principles of fire-proof construction and patron safety which were constant through most state building codes, although the codes themselves differed as widely as the ability and educational background of the men who drew and enforced them. Also the Society of Motion Picture Engineers, the Research Council of the Academy of Motion Picture Arts and Sciences, and the several chapters and committees of these bodies had investigated and released for use certain ideal standards and practices relating to projection, sound, acoustics, projection rooms, stages, et cetera. And an alert trade press had encouraged design specialists, sales engineers, manufacturers, and vendors to write illustrated articles on their particular specialty for their every-fourth-week physical theatre departments. But nowhere in this theatre industry was there a single coordinated reference source where all such matters could be found reliably recorded and authoritatively indexed for the widest possible use.

In the meanwhile, the entire motion-picture industry, from its studios to its theatres, had passed through the growing pains of its mushroom-like growth and had accomplished its full stature among America's leaders. With that full stature, just as the thousands of covered wagons and gilded bathroom scenes gave way to story, skilled acting, and restrained art on the screen, the domed palaces dripping with objets d'art of the middle 1920's gave way to functional planning, patron comforts, better projection and sound, and a less blatant and awe-inspiring, but more intimate and restful plan in the theatre.

During this change from the original nickelodeon, through the "pomp and circumstance" of the big deluxer, and on into the present more solid and permanent era of the American theatre's growth, many of the nation's 18,000 theatres have been bent, twisted, and made to conform to the changing trends to the place where they bear little resemblance either to their predecessor or to the modern theatre they are supposed to represent. Others, due to location or economic limitations approach their old age with the same outmoded characterization that attended their birth, and date them as obsolete examples of theatre design and equipment. As a result, it has been reliably estimated that out of the 18,000-odd theatres now in operation in the United States, there are only 5,000 that are either new enough or have been so thoroughly and completely remodeled as to merit the title of modern.

It is for the benefit of the ownership of the other 13,000 U. S. theatres (and untold thousands in neighboring countries and abroad), of the men who will eventually be called in to modernize or replace them, and of the companies that will create and apply the materials and equipment which they will need that these annual, cross-indexed volumes of THEATRE CATALOG has been established.

* * *

As this Fifth Annual Edition joins its predecessors on the shelves and desks of the industry's leading theatre executives and designers it is a pleasure to announce that, effective with the 1945 Edition, THEATRE CATALOG has been placed in the reference libraries of 37 of the leading architectural schools in the United States and Canada, where their use value has been commended and their annual continuance requested. While small in number, we feel that these 37 copies will do much to interest and influence the architectural minds of the future from which will originate the continued growth and development of the theatre industry.

However, there is still another group which we hope to serve.

The last war effort, with its army camps, war plants, shipbuilding yards and research centers scattered over former waste lands and farm areas, has created entirely new population calls and has implanted the need for a modern motion picture theatre in many spots that formerly possessed no such need. Due to this one factor, only the scarcity of some materials, the current rules against building, and excessive costs of construction are preventing the construction of between 5,000 and 7,000 small and medium-sized additional theatres to the native scene. Such are not replacements, but a very logical and needed expansion apace with the educational and living standard growth of a great nation.

The answer to this need may be satisfied by either the economies of pre-fabricated arch construction and 35-mm. equipment or by the non-fireproof requirements of the 16-mm. safety film equipment. But, in either case, THEATRE CATALOG is designed to serve.

It is to the builders and developers of this industry, with their tremendous potential of immediate growth, that this latest of these five editions of THEATRE CATALOG is respectfully presented.

1946-47

To the Memory of

THOMAS ALVA EDISON

who, through his own efforts and the coordination
of the collateral work of others, laid
the commercial foundation of the
motion-picture industry,

This Edition Is Respectfully Dedicated

THEATRE CATALOG

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WILL A. WHITNEY
Editorial Director

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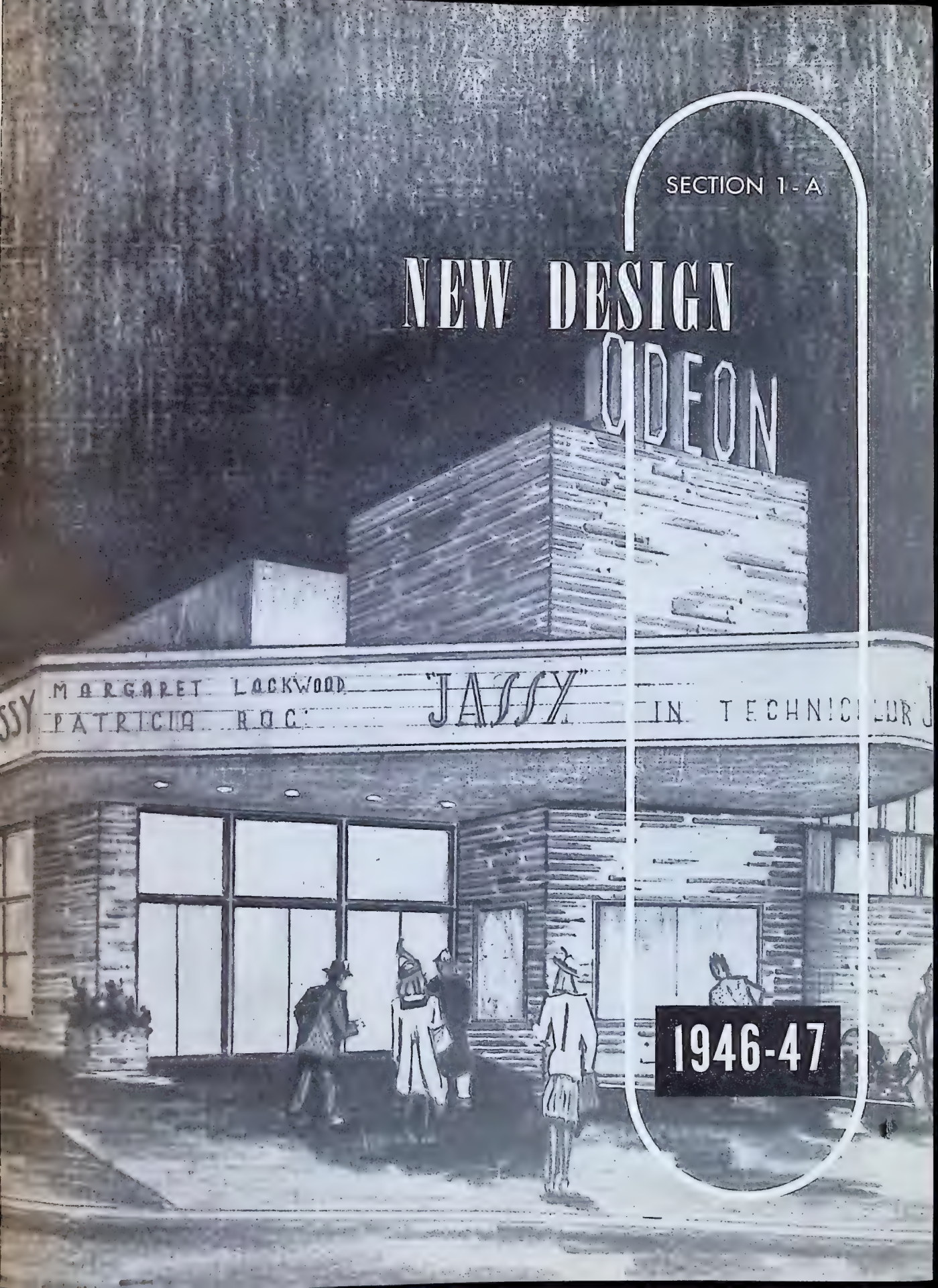
DESIGN and CONSTRUCTION

SECTION 1 - A

NEW DESIGN



1946-47

Unsolved Problem of Architectural Design

A Critical Analysis of Sources of Design For Commercial Architecture, Advertising

WALTER SOBOTKA
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We have seen such structures before. We remember them as the skylines of World Fairs and huge exhibitions symbolizing the progress and the achievements of Twentieth Century civilization. Dynamic curves range like wings into the sky, doubled and tripled in rhythmical repetition, spirals and spheric bodies compete with towering rudiments of dam-like walls, pylons of all shapes and sizes emphasize the elevating verticalism.

Architects and designers have had a holiday from functionalism. A generation, frustrated by the sober reality of life, was allowed for once to indulge in emotional orgies of design. It is hard to get back to the desk of every-day life after the hilarious freedom of playing and roaming. The layman, as well, feels the stimulation of such uninhibited imagination displayed before his eyes; it comes back to his memory nourishing his natural resentment against restricting art principles and philosophy. As the domesticated wild animal, once it has tasted blood, is said to fall back into its inborn ruthless instincts, the public opinion mutinies against its cultural responsibilities and plunges into complacency towards its human inclination for enravishments and emotions.

The "law of the function," which has pulled the "Modern Movement" out of its dramatic struggle at last onto a sound platform, has, in fact, never been wholeheartedly accepted by the public; never have the sacrifices, necessary for the adoption of a new civilization-wide attitude, been honestly made without mental reservations. The atmosphere of public opinion has never been cleared of the residues from Victorian mentality. In addition, the germs of the growing commercial spirit have newly infested the air.

Although the merits of "Industrial Design" and modern architecture have been acclaimed and have become a part of present way of life, their philosophical foundation has rather been imposed upon civilization by a few than adopted by the public. The resentment—at least the indifference—towards the idea that things should be shaped according to their actual, humble performance and in keeping with their materials, technologies, construction, puts functionalism into the permanent status of an experimental venture. People simply do not dig deeply into the problems of design and have no understanding whatsoever for what it is striving. Hence, all the misinterpretations of function as being in controversy with beauty, which, on its part, is only found in traditional period styles, its being applicable only to utilitarian commodities and not to objects with social implications. An indomitable romanticism considers the performance of such more important objects only the byproduct of artistic shaping and decorating. This shaping might be done from a purely aesthetic viewpoint of design or in the emotional spirit of a symbolic theme.

Strictly ideological architects and designers persist in the orthodox interpretation of physical function alone being the theme of design; others have widened the issue of function by liberalizing its definition from a well-defined technical performance into a more rationalistic flexibility, necessary in human activities. Allowance for some abstract symbolism is exemplified in "streamlining," whenever it is done only for the expression of the supposedly speedy movement in the performance of an object in question. Some danger of drifting away from true functionalism is, of course, implied in such broadness of interpretation.

There are many symbols in existence by tradition and everybody knows what they stand for. Government is yet the symbol of power and its buildings are taken for the visible signs of it; a church is yet involved in symbolic meanings beyond the merely physical function of an assembly hall.

In modern architecture these symbols are not made the theme of design, but they can be expressed in composition, though subordinated to the requirements of the specific designation of a building, preferably in a clean separation of expressive methods. This means that the symbolic significance should not affect the functional type itself. "Monumentality," for example, is not an end in itself but a byproduct of other qualities.

Whenever modern architecture encounters such a problem, the controversy

DREAMS OF PROGRESS . . . Architects and Designers Have Had a Holiday from Functionalism.

between pure functionalism and decorative symbolism is decided by public opinion in favor of the traditional way, thus depriving the progressive direction of the possibility to develop their new solutions and to establish new types. It is significant that up-to-date governments do not believe in the ability of modern architecture to serve their representative purpose; invariably they favor a purely formal and academic monumentality in traditional classicistic forms. Churches are yet preferred in mystical Gothic, while banking institutes, in displaying their economic power, insist on columnar fronts. A university has even gone so far as to symbolize the sublime meaning of education in building a "Cathedral of Learning." No wonder that also theatre managements ask for their share in this concert of symbols.

These obstacles to the popularization of a strictly functional architecture might be gradually overcome, as with time, at least, some obsolete symbolisms, such as expressed in the saying "my home is my castle," are bound to subside before a more sober and realistic attitude.

A new and more dangerous menace, however, has arisen in "Commercialism" as the new power in economic and cultural life. The change from the "Industrial Age" into an "Age of Distribution" has almost gone unnoticed, but is a fact. The distributive organization holds the key position in a community and has monopolized the relationship between consumer and producer. Although this refers primarily to so-called consumer goods, the distributive system is persistently widening its range over all commodities. Altogether its spirit penetrates public opinion and all cultural concerns including education.

Commercialism favors the weaknesses of human nature for its own egotistic purposes. To this end, it hushes all attemps to reinstate anything like idealistic principles of production and design, dispenses the public from feeling any conscientiousness in this respect. Adverse to art philosophy and practically to any philosophy but the worship of the dollar, commercialism has promoted an anarchic opportunism worse than anything that happened during the Victorian era. Even "Eclecticism" followed its principles one at a time. Today many variations of eclecticism flourish at the same time, all directions of art and design—even the "modern"—are indiscriminately promoted as a commercial commodity, should somebody pay his dollar for it. The evolution of a contemporary style expression is obscured by the confusing race among fashion trends in all fields of distribution. Functionalism is distorted into the grotesque by superficial symbolism or merely childish decoration. So far has the commercial spirit diluted the achievements of industrial design, that it does not refrain from camouflaging the industrial products into the costume of an embalmed craftsmanship. For the sake of commercial selection pseudo-individualistic additions offset the merits of standardization.

"Give them what they want" is the comprehensive slogan of this distributive age, the *panem et circenses* in the sales-

MASSIVE ARCHITECTURE . . . Government is Yet the Symbol of Power.

man's empire.

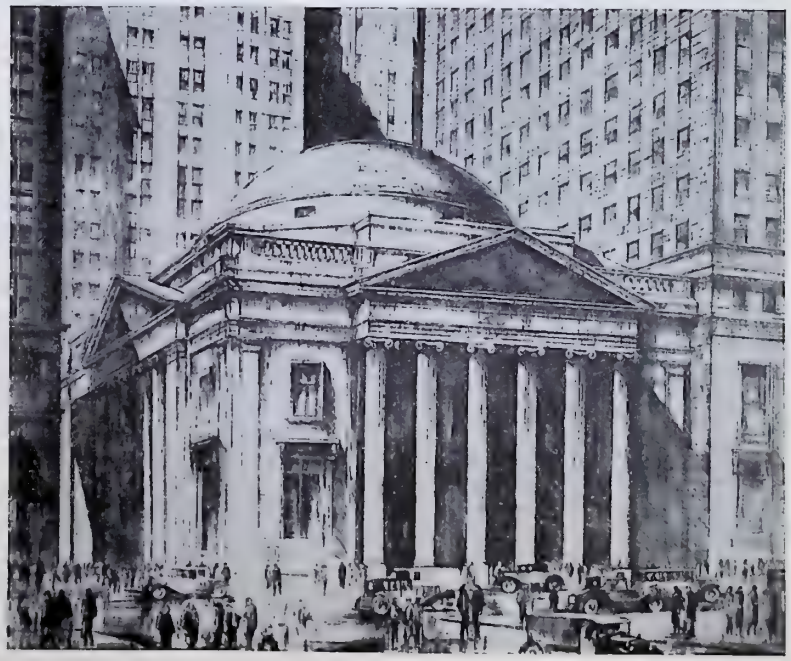
Only those who by education and background have received and preserved some ideals beyond the primitive ethics of social life, or have, at least, understood the ideal spirit that has inspired former more fortunate generations, can see through the smooth crust of civilization into the inside of a badly affected organism.

Those who cannot see are not bothered with it. They consider convictions as a private hobby of some designers, for the rest the designer has to please them. Individuals expect all consideration for their unpredictable and arbitrary "preferences," while they are not ready to listen to a designer's logical arguments, if altogether understandable to them.

The anarchic confusion—its limitless variety somewhat smoothened by the herd instinct of people—is deeply rooted in the economic structure and has not yet reached its peak as long as the distributive organization is ever expanding its hold on more and more commodities. With every item drawn into the commercial circle another piece crumbles off the weather-beaten rock of cultural concerns. It would be foolish to ignore or to belittle this conspicuous destruction.

An almost endless list of examples can

BANKING INSTITUTIONS . . . Insistance on Columnar Fronts. (Courtesy Girard Trust Company.)



illustrate what commercialism has done to design. The more recent developments of the bentwood chair, silverware, and other home-furnishing items, all of them show the increasing retrogressive tendency from sound industrial design towards period styling and decoration. Automobile design as well is in a dangerously superficial and unfunctional way of symbolizing decoration. (A comparison between the puritanical "jeep" and the snappy design of a "Buick 1946" may provide some food for thought about humble performance and "heroic" gesture.)

It seems as if those commodities and quality levels which attract less attention from the "stylists" are in a better position to carry on in the spirit of good and functional design.

Architecture, suffering mainly from its own glorious tradition, remained, at least for some time, undisturbed by commercial doings. The use of brick and stone veneer in front of wooden frame construction, however, reflects the general commercial spirit. It is one of many examples of how things are no longer valued for what they are but merely for what they look like. Residential architecture was the first to suffer at the hands of commercial builders and developers in quality of plan, design, and construction. Instead of these, chimes, lanterns, wrought-iron railings, and ridiculous gables provide the effective selling points. The pre-fabricated house, as well, is on its way into strictly commercial channels. The imitation of ordinarily built houses forecloses the evolution of its own new type. Similar to the bentwood-chair manufacturer's pride that his product does not look like bentwood, here too the industrial prduction is betrayed for the sake of playing to the tune of snobbish prejudices.

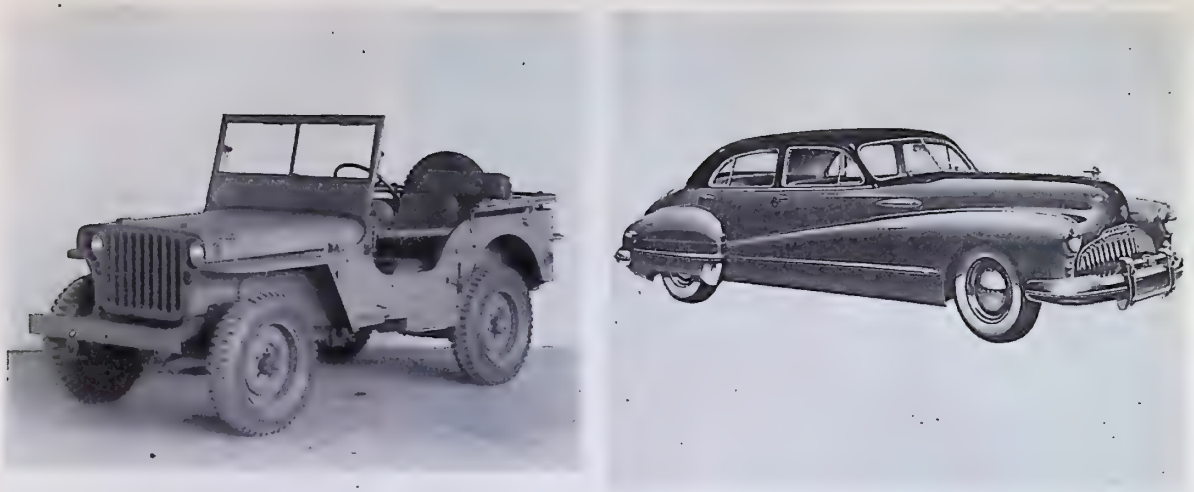
DESIGNS . . . All of Them Show the Retrogressive Tendency from Sound Industrial Design toward Period Styling and Decoration.

Another phenomenon of commercial growth is "Commercial Architecture." The totalitarian tendency in "Selling" requires that the physical accomodations for selling be integrated into the very function of selling. Interior and exterior architecture for commercial enterprises is part of display and advertising. Store fronts and the interiors of stores, bars, restaurants, gas stations, hamburger stands, and even theatres belong into this category. There is nothing wrong with that, as long as—according to points previously mentioned—a reasonable design fulfills the physical requirements and in doing so also serves the purpose of attracting the attention and approval of the passerby. This method is usually not convincing enough to the publicity-minded manager. Advertising is the main concern and, although he might not be able to express it, he will accept only a design the theme of which is "advertising."

Inasmuch as there does not exist an architectural type for "advertising" or for "stimulating attractiveness" as an end in itself, any attempt of expressing such function in symbols of architecture is doomed to end in wild and loud decoration. The former use of more or less conspicuous letterings or signs for day and night had to put up with increasing competition for the attention of the street. The signs grew to oversized dimensions with all sorts of illustrative motifs and animations added until the whole building front was caught in megalomaniac bragging. This has as little to do with architecture as advertising copy has with literature, although both might deserve the term of fiction.

In looking around for adequate motifs designers tried to overwhelm the emotion of the public with the pulling power of monumentality. Naturally the precedents of exhibition architecture provided a perfect model for a comparable purpose. The temporary nature which gave birth to all this "papier mache monumentality" justified such three-dimensional dreams as a sort of exercise and self-assurance that there is yet some pull in design attuned to the breath-taking progress in the technical field. Translated into permanent structures and into lesser topics, these overpowering forms lose all of their ephemeral sketchiness and stand there in false importance as a warning symbol of illiteracy.

When education drops to the level of vocational training—a tendency apparent in present trend—it opens its doors to commercial indoctrination of the young generation. Designers are then trained to swim with the current, this being the successful way of making a living; they



FOOD FOR THOUGHT . . . Humble Performance and Heroic Gesture (Courtesy, respectively, Willys-Overland Motors, Inc., and Buick Motor Division of the General Motors Corporation.)

are trained not to do their own thinking, but rather to look out for inspirations and for intimations of the fashion trend to come.

Designers trained this way have not the benefit of a good education. Their courage in approaching major problems is the courage of ignorance. If there is only intuition and no ability to curb imagination by methods of logical speculation based on sound general principles, then a person cannot reach a very high level of design. Such a lack of art principles is strongly to be felt in the commercial levels of all types of design and their often unintelligent results. Instead of a modern concept, this aimless direction falls for "novelties," just as the uneducated listener falls for cheap slogans of demagogy. Instead of proper procedure of composition and resulting relation among organized shapes and areas, an often senseless compilation of gathered motifs ends in a vulgar concert of crude elements. Exaggeration is a common pitfall neglecting all restrictions of scale and proportions. Worst of all, the lack of human touch and decency of design is poorly covered up by the hollowness of decorative schemes.

While this refers to all types of commercial doings in the field of design, some of the executed or only planned motion-picture theatre fronts fit particularly well into this picture of a new low in design level (or rather general cultural level) these days. Formerly romanticism had played its tricks on the scientific artistry in using exotic building types, such as mosques with minarets, for places of entertainment, or a frozen academism had tried to revive the splendor of festivity in more or less pure interpretations of period styles. This approach of professional architects with little imagination some 30 years ago has been reversed into another deplorable crisis at the hands of commercial design. Uncontrolled imagination now runs amok with more powerful weapons in total warfare.

Criticism necessarily concentrates on actual evidences of failures which are only the symptoms of a more serious affliction. Specific conditions might even be improved by criticism, but that does not reach the very roots. The direction of a powerful current cannot be reversed, time cannot be turned back, as, for example, the revivors of craftsmanship some 80 years ago have vainly attempted. Swimming against the current is the privilege of only a few outstanding individuals. Learning to swim with the current, as so many do, is giving up and letting things go their way. A more constructive disposition might attempt to build up the banks of a river and to use dams against flooding and for diverting the irresistible force into channels where its destructive power may be put to work.

It would be worth the effort of the best minds, many of which remain in resigned aloofness, to help draw the modern movement into a more realistic

SELLING POINTS . . . Provide Effectiveness.

COMMERCIAL ENTERPRISES . . . Interior and Exterior Architecture Part of Display and Advertising. (Courtesy The Texas Company.)

stage of activities. Too much of its energy is wasted in utopian ideology. The dream of a unified style to come for a new world, when once more all people will have the same attitude towards life and its formal expressions, is a fallacy in itself.

The same pitfall which happened to the artists, who for a short time succeeded in reviving craftsmanship instead of turning towards the industrial product, will happen again to the present generation of designers, if they hang on to their dreams and ignore the expansion of commercialism. It is there, and one has to cope with it.

This is not meant to be a challenge for a hopeless fight, rather for a revision of the respective positions. Commercialism and its requirements are given facts, the methods of satisfying them can be modified and influenced. The principles of modern design are not really at stake; they can be adhered to in a reasonable procedure of fulfilling the commercial needs.

The facts can be boiled down to a few statements:

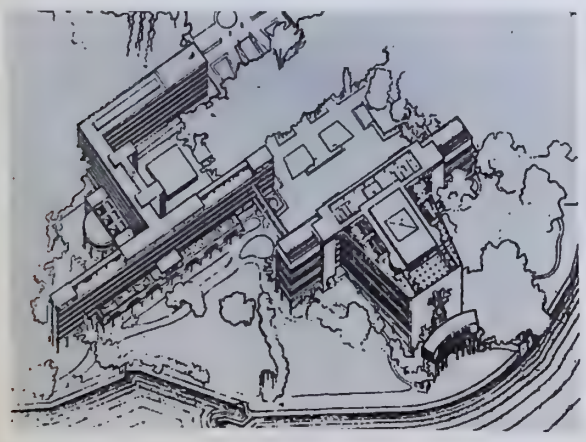
(1) Mass production and standardization can be reconciled with the requirements for commercial selection. If standardization were furthered and persistently followed to a far-reaching point, the rest of the effort could concentrate on selection by providing variety through assembly (unit furniture, pre-fabricated houses) and through variety of minor treatment (surface material, color, texture), instead of the present practice of styling with additional decoration.

(2) Evidently better performance, another result of complete fabrication, is the best selling point; it quiets the arguments about design. New objects are accepted even with sacrifices on the nostalgic side, whenever their performance concerning techn cal achievements, operation, quality, maintenance, and last, not least, comparative costs prove their physical superiority compared with the former product. Nobody argues seriously about standardized automobile design, kitchen equipment, and so forth; on the other hand, many a modern design (furniture) suffers from lack of technical and qualitative perfection.

(3) Commercial people can be convinced that good design will not necessarily hurt business. On the contrary, it might increase the prestige of commercial enterprise, if promoted by their own advertising in a wide campaign for "improvement of taste." Without the cooperation of the commercial setup, no other platform could possibly be popular enough to score appreciable results.

As to the special field of theatre design, it seems within the possibilities that the interested designers themselves cover this limited field with their propaganda. A selection of good theatre fronts published for this purpose with emphasis on the particularly neglected signs and advertising fixtures should gradually improve the situation. It should convince the theatre managements, if there is yet any hope in the future of design.

DESIGN AND EXECUTION . . . The Controversy between Pure Functionalism and Decorative Symbolism is by Public Opinion Decided in Favor of the Traditional Way.



Modernization of the Theatre with Light

A Consideration of How Modern Lighting Opens Many New Ways to Attract Patrons

C. M. CUTLER
Lamp Department, General Electric Company

To hold patronage and enhance profits, there are two very important steps a theatre operator can take, offer popular shows and furnish attractive surroundings.

The constant aim of progressive operators and owners is to provide a theatre which is inviting, pleasant, convenient and comfortable; in short, a place with pleasing atmosphere!

Atmosphere in the show business can make or break a following! It is the sum total of all those things which determine the public's reaction.

Because profits and patronage are so dependent on Atmosphere, those elements producing it deserve careful analysis.

Some of the things which help to influence human reactions are fixed. For example, the general contour of the building—the structural size and shape of the lobby, foyer, auditorium and lounge are already determined. But modern lighting opens up a multitude of new ways to attract patrons.

A wide range in types and sizes of lamps are available for theatre lighting. However, most of the ideas in this article utilize three of the newer General Electric Company types. These particular lamps have extensive possibilities in both present and future lighting designs. They are the G-E fluorescent, the new Slimline, and the Circline fluorescent lamps.

By using these lamps in simple standard fixtures, like those shown in the accompanying sketches, the task of modernizing a theatre with light can be both inxepensive and effective.

These suggestions show how easy it is to produce a great variety of wall and ceiling patterns in light, by simply arranging the same standard fixtures in different combinations. They also show how such standard assemblies may be used to create varied effects in line, form and finish. The advantages are (1) saving in time, (2) reduced material costs, (3) simplified installation, and (4) greater flexibility.

In addition, some sketches illustrate built-in architectural elements which employ the newer fluorescent lamps and other types of lamps especially helpful for theatre use.

Theatre owners, architects and technicians may find these ideas both stimulating and practical in planning their modernization program.

BASIC THEATRE AREAS

Here is where the great flexibility of light can be used to harmonize with the changing surroundings. From an atmosphere of anticipation and cheerfulness, so desirable to create in the outer lobby, there is a gradual reduction in the quantity of light as we proceed to the comfortably conditioned auditorium.

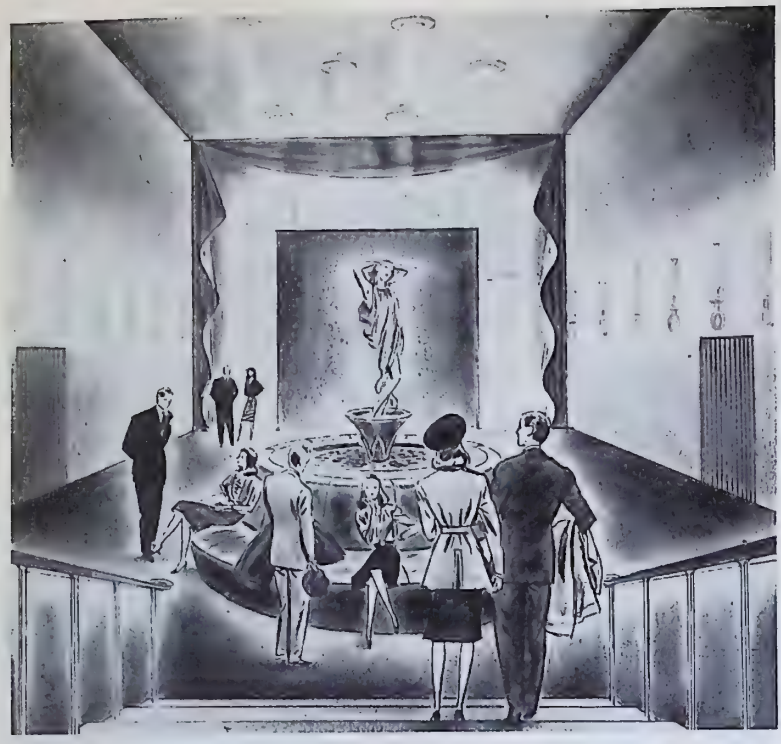
Suggestions show how to secure changed lighting effects for each area by means of versatile pattern arrangements using simple standard fixtures.

The illustrated profile of a typical modern theatre serves as an index to the basic lighting areas covered in this article.

The Marquee

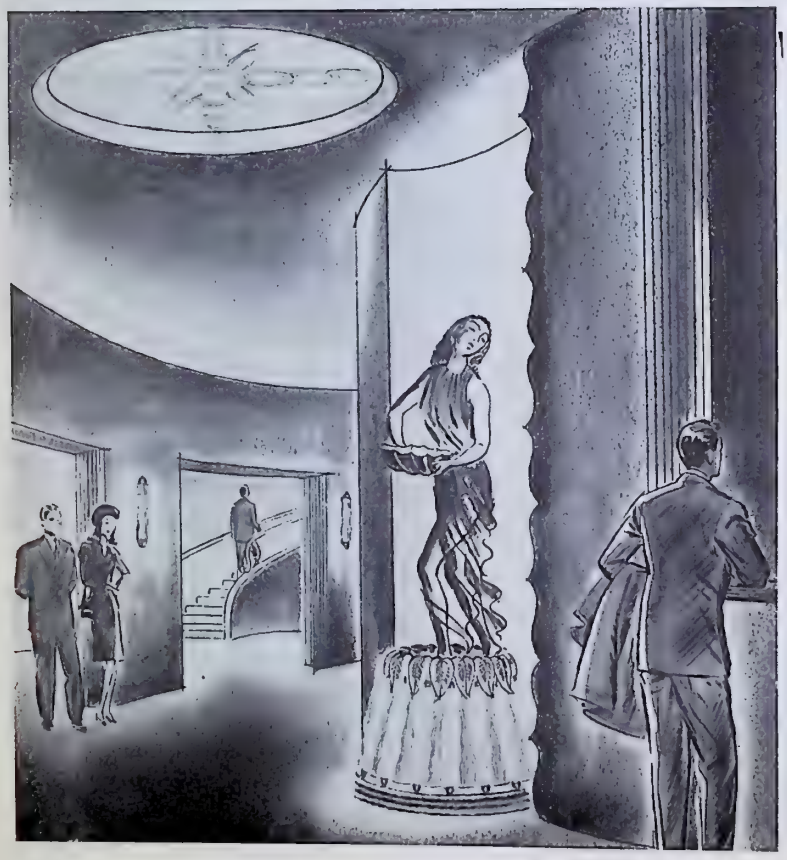
To attract attention from afar, and to stop passersby—these are the two primary functions of a theatre marquee. At this attention point no tool can equal the effectiveness of light.

THE THEATRE MARQUEE is designed to attract attention from afar and to stop passersby. The vertical signs and attraction panels compel attention when they are bright and have clean-cut legible letters. The soffit of the marquee can act as a puller by employing accentuated brightness, sparkle, and directional light. Well-lighted posters can start their stopping and selling job at once. Here lamps recessed in back and concealed should be used.



THE INNER LOBBY (above) can be modernized without closing the theatre by the use of up-to-date ceiling, side-wall, end-wall, stairway, and centerpiece lighting and lighting fixtures, as indicated in this picture.

THE FOYER LIGHTING (below) considers the fact that this is the last room through which the patrons pass before entering the darkened auditorium. There should be a gradual reduction in brightness.



The vertical signs and attraction panels compel attention when they are bright and have clean-cut legible letters. Lighting methods which facilitate changes in color, brightness or pattern are desirable and the silhouette letter type with a luminous background is popular. This background may combine both fluorescent and filament lamps.

The soffit of the marquee can act as a "puller" by employing accentuated brightness, sparkle and directional light.

Well-lighted posters can start their "stopping" and selling job at once. Here, lamps recessed in back, and along the edges for concealed lighting, can be supplemented by the light from projector lamps in adjustable units from above.

Outer Lobby

Because this area must serve as an entrance to the inner lobby, the lighting should be adequate for traffic—attractive for selling, for stimulating interest. Here the entire illumination design can be arranged to give a relatively large amount of general light to accommodate congested traffic, to focus attention on poster panels, and at the same time, impart a feeling of cheerfulness and invitation.

To achieve these effects, walls and ceilings may be fairly bright. Lamps in the ceiling, in coves and corners, in conformity with modern lighting and architectural techniques, will often be recessed or shielded so they harmonize with the decorative pattern of the room. The illustration shows a rectangular cavity in the ceiling where louvered fluorescent units provide the overall lighting. Projector lamps in adjustable sockets highlight the walls, while Circline lamps add decoration.

Inner Lobby

Ceiling, side walls, end walls, stairway and ornamental centerpiece are all vehicles for the modern application of light to create an atmosphere of freedom, spaciousness and comfort. Along the ceiling there are continuous rows of Slimline fluorescent lamps with projector lamps in adjustable sockets, supplying directional down-light to spotlight the ornamental centerpiece. Along the side walls are regular fluorescent lamps in vertical fixtures.

Exposed colored fluorescent lamps may be supplemented by concealed Slimline lamps in coves to give graduated wall toning and color effects.

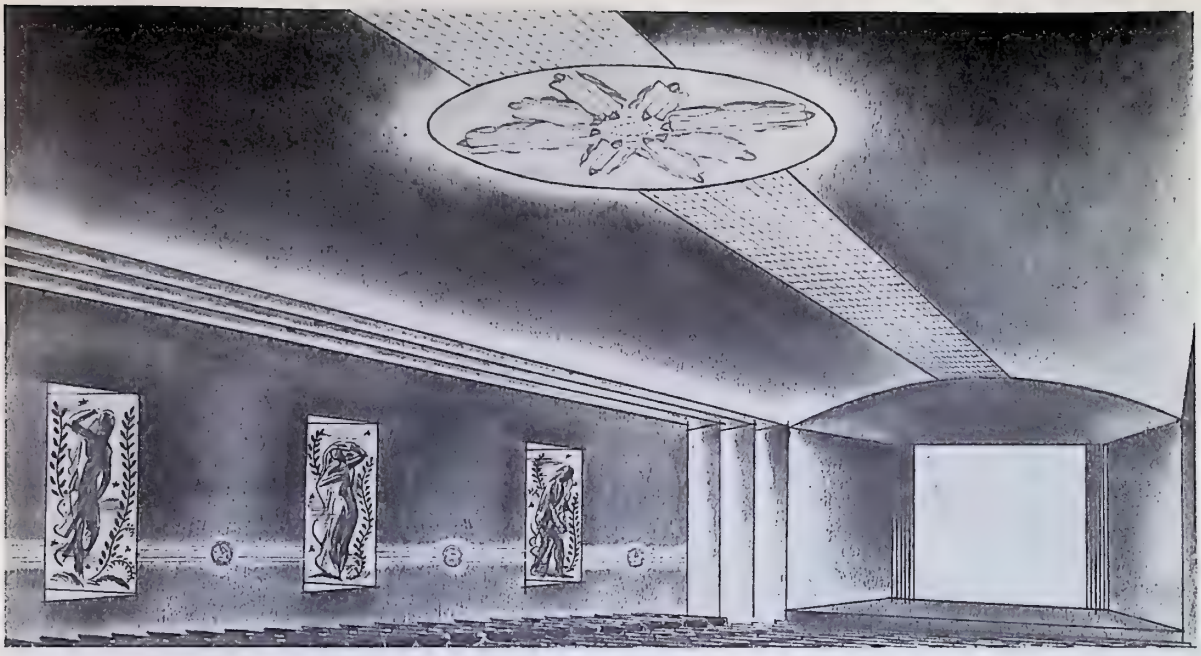
Slimline lamps in continuous rows are fitted beneath the stairway handrail.

Here, indeed, is an effective way to modernize without closing the theatre or changing existing structural forms.

The Foyer

The foyer is essentially a circulation area. When you plan lighting—remember that it is the last room through which the patrons pass before entering the auditorium.

While there should be a gradual reduction in brightness, extreme care must be taken to guard against dull or deadening effects. Here, an ingenious use of light can create an atmosphere of interest, anticipation and restfulness. Architectural elements built into the ceiling may use Circline fluorescent lamps in attractive patterns and offer



THE AUDITORIUM should rate high in the attention that is given to its lighting. Here is where the patron spends most of his theatre time and also where he has the definite opportunity to form an agreeable impression. Ceiling, sidewalls, and forward walls need a low tone of illumination. New impressions can be created quickly and inexpensively in the auditorium through the use of color where there is an adequate electrical control system. The illustration shows suggestion for using the same standard lighting chassis mounted horizontally in a circular centerpiece, while long lines of fluorescent lamps are concealed in the decorative panels.

one of many possibilities for the ceiling arrangement.

Pictures and sculpture highlighting with Slimline lamps concealed in coves will add interest and appeal. Also, well-controlled illumination is neccessary so that none will flood through the doors into the auditorium. Lamps in warm and inviting colors create harmonious color effects.

Lounges and Promenade

In lounges and promenade, where people relax and wait for their friends, lighting should create a favorable impression.

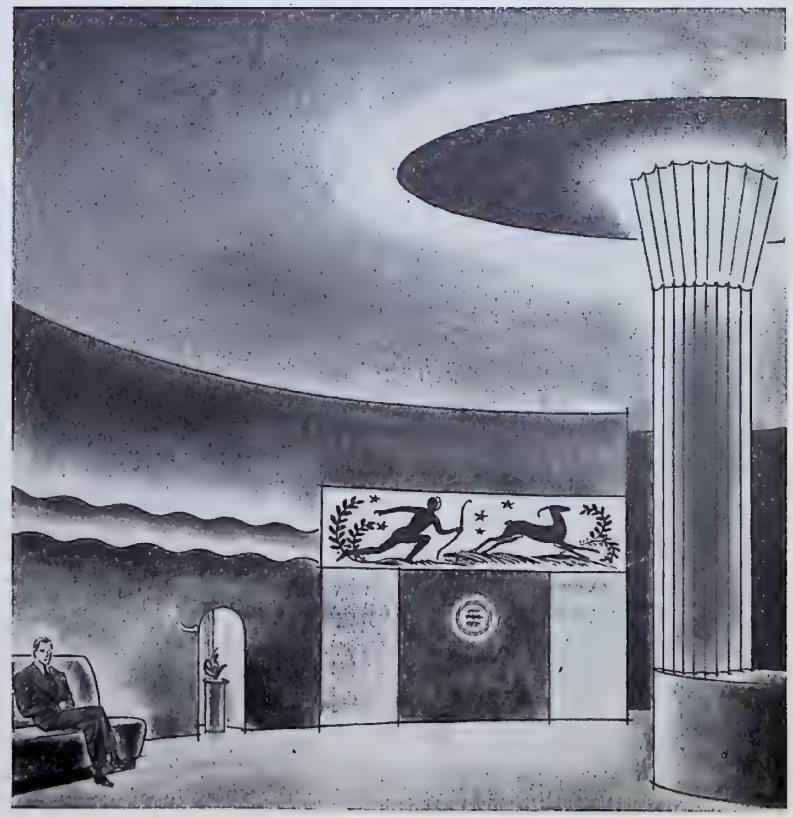
The lighting treatment can add an inviting and comfortable atmosphere and at the same time be complimentary to complexions. Lounges and promenades offer excellent opportunities for a decorative mural lighted by concealed fluorescent or Slimline lamps, and much of the atmosphere effect can come from fluorescent light sources concealed in wall coves. Also, this is another ideal place where coming attraction panels to acquaint patrons with future programs, and photographs for decorative purposes, may be displayed with the aid of light.

General atmosphere lighting, of the soft, well-diffused type, can be produced by concealing fluorescent lamps overhead, to illuminate the ceiling surface.

Auditorium

The auditorium should rate high in the attention given to lighting. Here is where the patron spends most of his time, and also where he has the definite opportunity to form an agreeable impression. Ceiling, sidewalls and forward walls need a low tone of illumination.

LOUNGES AND PROMENADE, where people relax and wait for their friends, should have lighting which creates a favorable impression. The lighting treatment can add an inviting and comfortable atmosphere and, at the same time, be complimentary to complexions. These areas offer excellent opportunities for a decorative mural lighted by concealed fluorescent or Slimline lamps. Much of the atmosphere effect can come from concealed fluorescents.



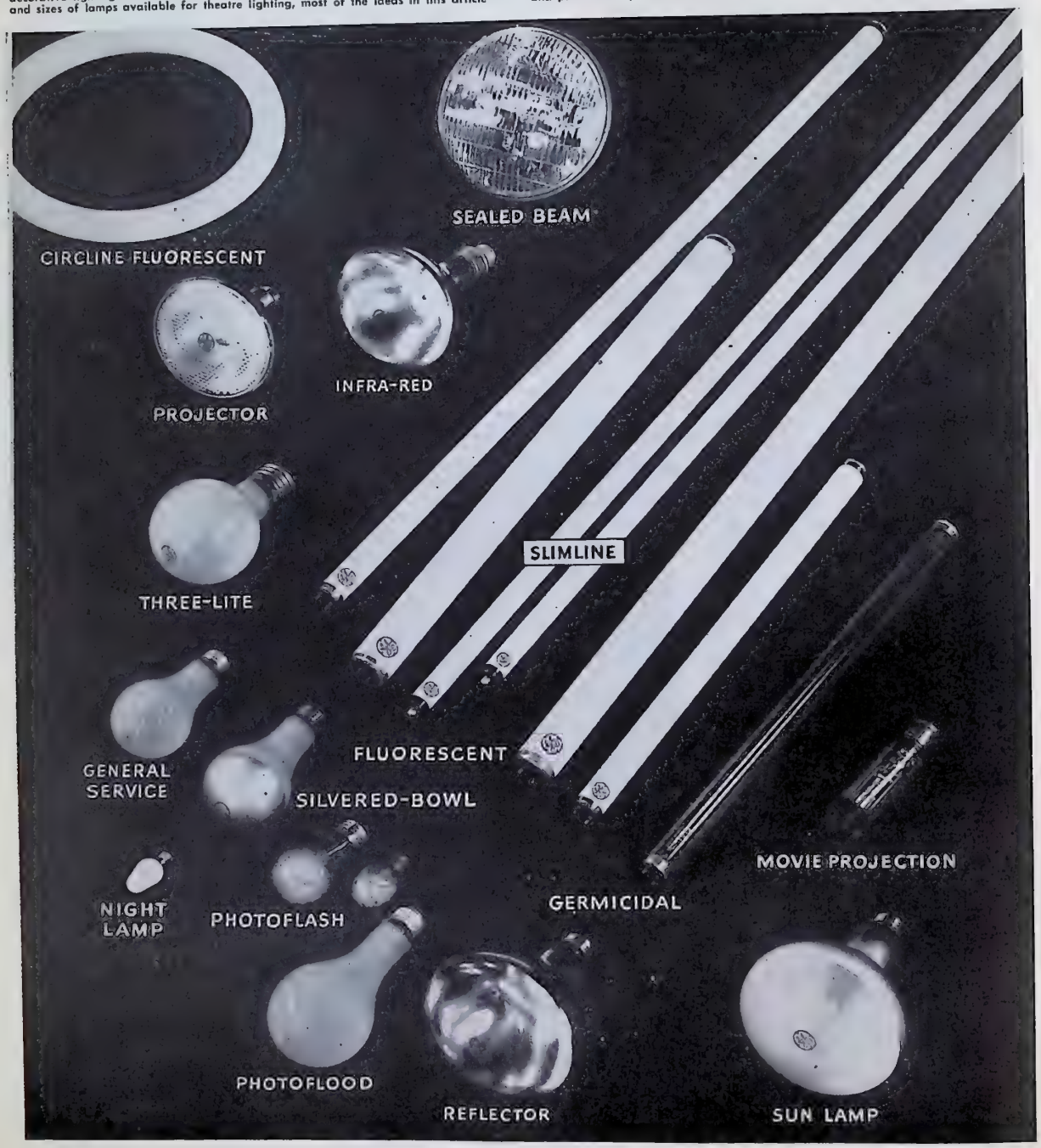
New impressions can be created quickly and inexpensively in the auditorium through the use of color where there is an adequate electrical control system. The illustration shows suggestions for using the same standard lighting "chassis" mounted horizontally in a circular centerpiece, while long lines of Slimline fluorescent lamps are concealed along edges of the panel in the ceiling, and behind coves in the walls. Medallions, placques and murals can be silhouette lighted. Also, combining Slimline and Circline along the walls creates attractive wall pattern possibilities.

BLACK LIGHT

"Black light" has been developed in recent years for the purpose of supplying a particular type of supplementary light, usually for darkened areas. Black light is a popular term for near ultraviolet radiation which is invisible. Certain materials have the property of converting this radiation into visible brightness. The specially treated fluorescent materials commonly used are plastics, dyes, paints, fabrics and inks.

Light in sharp outline or definite pattern can be confined to a definite spot. The quality of the light is such that decorative designs on walls, ceilings or carpets will glow pleasingly without detracting from the visibility of the picture. Black light is very useful as a safety feature for aisles and darkened corridors.

THE TYPES OF LAMPS discussed in this article are pictured here, together with other lamps which have a close relation to the theatre if not of the sort adaptable to decorative lighting. While General Electric Company has a wide range in types and sizes of lamps available for theatre lighting, most of the ideas in this article utilize three of the newer types: the fluorescent lamp, the Slimline lamp, and the Circline lamp, all of which have extensive possibilities in decorating with light. Theatre owners, architects, and technicians may find these ideas both stimulating and practical in planning their modernization programs for the country's theatres.



The Radio Center Comes to Cuba's Capitol

Studios Are Constructed by Circuito CMQ And Warners Will Operate the New Cinema

Since that day, some years back, when it was decided to house a cinema and broadcasting—however independent the two operations might be—under a collective roof, the idea has spread far beyond the limits of New York's famed Rockefeller Center, and "radio cities," such as that of WFRB in Baltimore, now to be found in many urban centers.

HAVANA'S RADIOCENTRO

Latest of such developments seems to be that presently under construction on Havana's famed Vedado—in 23rd Street, between L and M Streets, to be exact—by Purdy and Henderson Company for Radiocentro, S.A.

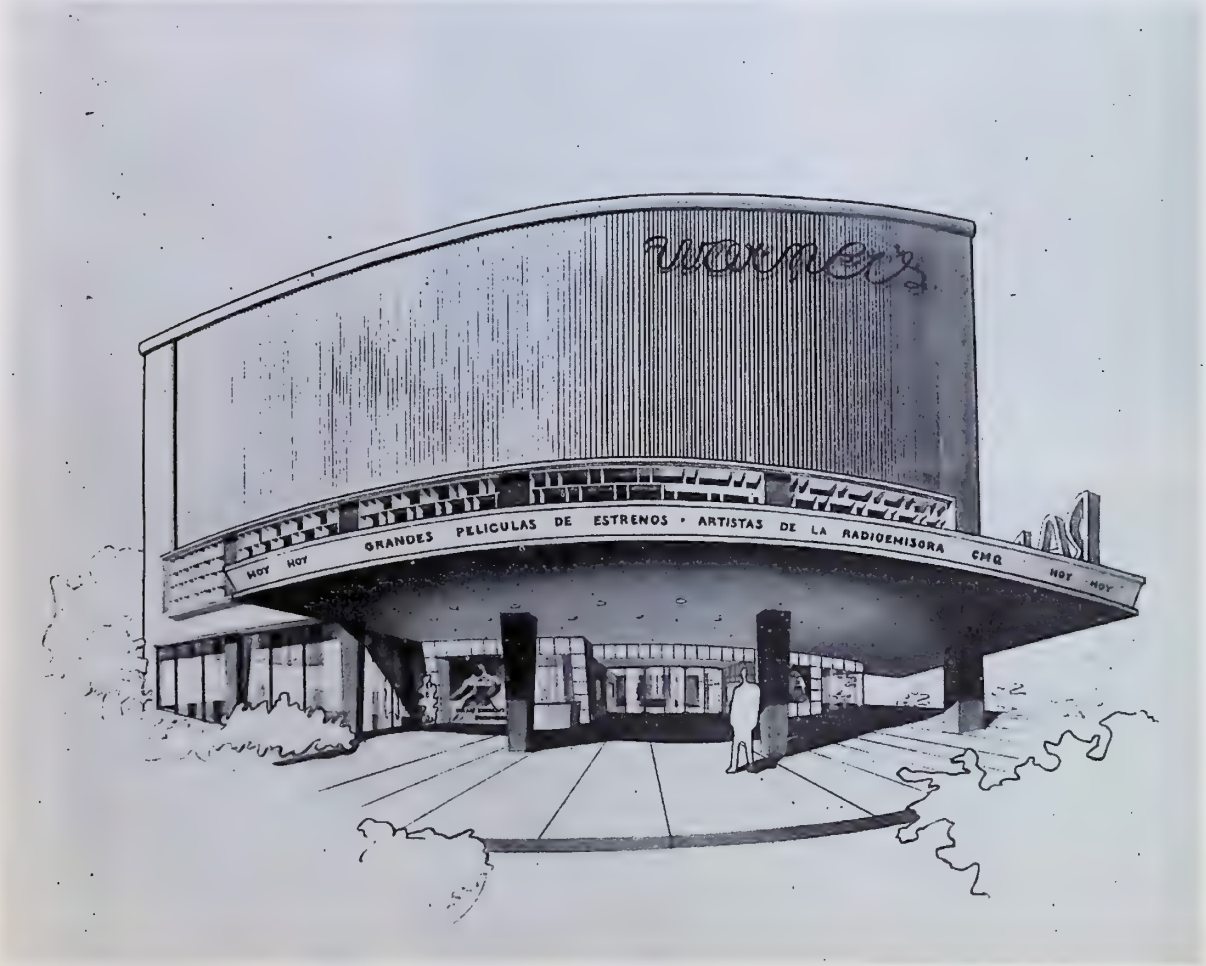
Havana's Radiocentro is a modern and sumptuous edifice, adding a golden link to the chain of beautiful buildings with which the Cuban capital has been adorned in its march of progress. Of elegant and modern lines, all of which combine in beautiful and substantial whole, is indeed an exposition of the technical and artistic resources of modern architecture. And from its central and elevated site, there will be extensive views, of grand avenues and panoramic vistas of the sea.

As in the case of its Manhattan forebear, Radiocentro will be a multiple project. Included in the project will be the studios of the Circuito CMQ; a 1,700-seat theatre, devoted to first-run motion pictures and stage shows featuring personalities of stage, screen, and radio; and several restaurants.

At the corner of 23rd and M Street, at a level 16 feet above the street, in two stories, will be installed a modern and luxurious restaurant. In the ground-floor there will be an exhibition hall for automobiles and airplanes, the CMQ cafeteria, and a lobby for artists and employes of the broadcasting company.

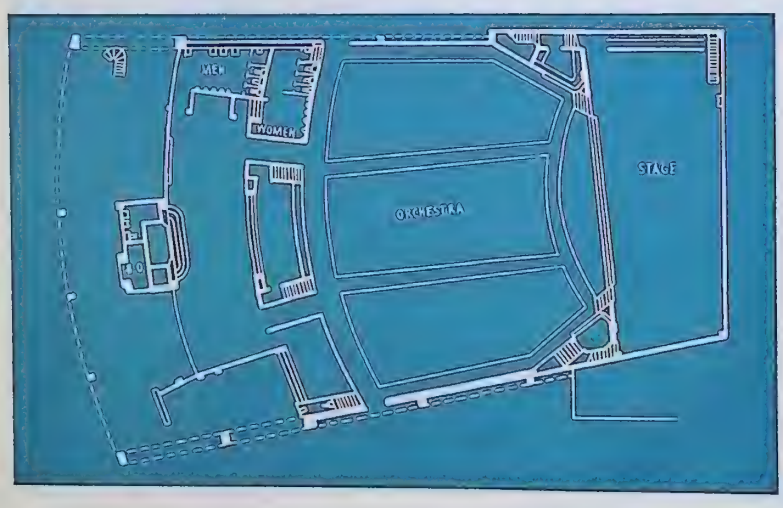
On the flat roof, 163 feet above sea level, will be installed a cabaret-garden, consisting of a dance hall, terraces, gardens, bar, kitchens, and the like. From the patio, open to the sky, a view may be

WARNER'S NEW THEATRE, Radiocentro, is the co-dominent feature of Circuito CMQ's Radio Center, in Havana. The theatre will be the only stadium-type cinema in Cuba. The latest equipment and facilities will be provided, including 1,623 seats of the Ideal Seating Company, projection, sound (Photophone of the RCA Victor Division of the Radio Corporation of America), air conditioning, and acoustics. Alexander Smith and Sons Carpet Company's Crestwood carpets will adorn the floors throughout the house, except for the lobby, which will be finished with either marble or terrazzo. Stage, screen, and radio stars will be stage: presented.



THE GENERAL PLAN OF THE THEATRE (above) shows the seating arrangement of both the orchestra proper and the stadium section, while below is seen the layout of the mezzanine level. Note how the otherwise wasted space at the proscenium end of the auditorium, due to the convergence of the walls, is utilized, to make dressing-room space at stage right and storage space at stage left. Note, too, the proportions (about 30 by 75 feet) of the stage.

THE PLAN OF THE STREET LEVEL (below) reveals the relation of the entrance and the public rooms to rest of the theatre. On each side of the entrance is rentable space. The spacious promenade is designed for comfort, with provision for flower boxes at appropriate positions. Lounges and rest rooms are at the far right of the area, with supplemental facilities also in the mezzanine level (see above). The theatre is planned to seat 1,623 patrons.



had, over the towers of the National Hotel, to the sea.

Architects on the project are Emilio del Junco, III, Miguel Gaston, and Martin Dominguez. Consultants for the development included E. C. A. Bullock, architect, on the theatre; J. A. Vila, R. Guttierrez, and M. Diaz, engineers, on the structure; N. Betancourt, engineer, on air conditioning; and L. F. Demestra, engineer, on electrical matters.

THE CMQ STUDIOS

The studios of Circuito CMQ will be not only the finest in the Republic of Cuba, equal to the finest anywhere.

The entrance to the broadcasting portion of the CMQ circuito will be thru a spacious lobby, in two levels, with double pillar, gardens, and wide stairs hanging in free form. Other facilities include two studio-theatres, each with a seating capacity of 525; two large music and recording studios; for studios for various programs; a special studio for the CMQ newscaster; relaxing salon and rooms for artists; assembly room for public functions and conferences; library; cafeteria for artists and employes; general offices; and work shops and store rooms.

Radio Station CMQ, according to the latest information at hand, is owned by Cambo and Gabriel, S.A., and broadcasts on a frequency of 690 kilocycles, with 25,000 watts power daytime and 15,000 watts night. The new studios will be the last word.

CINE RADIOCENTRO

The theatre of the project, to be operated by Warner Brothers, under the name of Warner's Radiocentro, will be the first stadium-type theatre in Cuba. The principal construction materials will be steel, reinforced concrete, and brick. The accompanying floor plans clearly set forth the relation of the various parts of the theatre.

In the plans, the notable aspect is the magnitude of the stage, indeed of sufficient proportions to accommodate not only any legitimate attraction it may be desirable to present but also to hold whatever radio programs need an expanse of stage.

Because of the stadium, a considerable area is available back of the last row of orchestra seats to be developed in spacious comfort. While not noted on the drawings, as reproduced here, the blue prints show the employment of jardinieres at strategic points, even on the mezzanine level. On the street level, there will be rented areas.

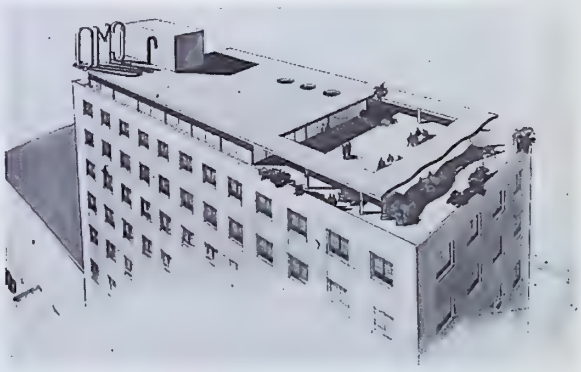
In the theatre will be installed the latest equipment, including 1,623 chairs of the Ideal Seating Company and the latest post-war installations of air conditioning, projection, sound (Photophone, by the RCA Victor Division of the Radio Corporation of America), and acoustics. Carpets of the Alexander Smith and Sons Carpet Company will be installed throughout the theatre. The interior and exterior lobbies will be grand, comfortable, and luxurious. The front will be constructed to permit the entrance of automobiles under the marquee. The stage, besides completely equipped for all theatrical productions, will also be planned to handle big-production broadcasts of Radio Station CMQ.

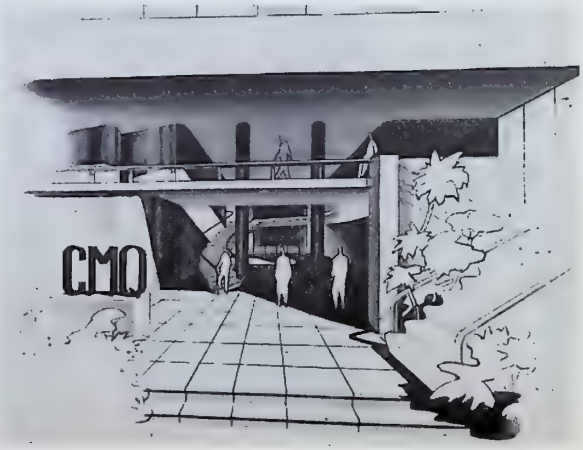
HAVANA'S RADIOCENTRO (above) shows the general relations of the whole development of Circuito CMQ, with the theatre, to be operated by Warners, at the left and the CMQ broadcasting portion at the left, where located also is the exhibition hall. The contour of the land makes effective the two levels at the left.

THE CABARET-GARDEN (right), located on the flat roof, 163 feet above sea level, will be equipped with a dance hall, terraces, gardens, a patio open to the sky, bar, kitchens, and so forth. From the patio, one looks over the towers of the National Hotel to the sea. The story-high CMQ sign will be visible for many miles.

RESTAURANT AND ENTRANCE FOR CMQ PERSONNEL (bottom left). At the corner, in two stories with open terraces, will be installed a modern restaurant. In the ground floor will be an exhibition hall for automobiles and airplanes, the CMQ cafeteria for artists and employes. To the right further is the personnel entrance.

THE PUBLIC ENTRANCE TO CMQ (bottom right) gives access to the studio-theatre of the Circuito CMQ. Through a spacious lobby, with a pair of plain but massive columns supporting the second level, are the stairs hanging in free form. Gardens will set off the entrance. CMQ will sometimes broadcast from the theatre stage.





Problem of Off-Street Parking Facilities

American Automobile Association Reviews Whole Field of Parking and Parking Lots

The parking problem of a business district will never be solved at the curb. Off-street facilities must be provided. Curb parking should, however, receive full and appropriate attention.

FACILITIES MOST NEEDED

In central business districts of most large cities and of many smaller communities, the number of curb parking spaces, reduced by requirements for space for loading zones, entrances, bus stops, moving traffic, etc., will even on a time-limit basis handle only a relatively small proportion of the potential demand for midtown parking space. The only way to provide more downtown parking for those who want it is by the provision of off-street facilities.

Present off-street parking facilities are far from adequate in most business districts, but not always because of an insufficient number of spaces. Often there are unused spaces when demand is greatest; but locations of unfilled parking lots and garages are inconvenient, fees charged are greater than motorists are willing to pay, it takes too long to park and unpark, service and protection are unsatisfactory, or combinations of these factors are involved. Some city officials have expressed the opinion that because there is ample off-street capacity to accommodate the greatest number of vehicles which accumulate in their business districts during the business day, there is nothing more the officials need to do. Yet the almost chaotic parking "confusion" existing in many such cities is conclusive evidence that the problem has not yet been solved. There is something more that officials should do.

Much more also needs to be done in meeting needs for other terminal facilities (such as off-street loading facilities) downtown.

Responsibility Assigned

One major reason for the present neglect of the parking and terminal facilities problem is the failure of city fathers to assign this responsibility to some appropriate official or agency. Several agencies have something to do with the problem, but despite its admitted importance, no one official or agency is accountable for the overall situation. Of course, such assignment of responsibility requires also the granting of proper power and authority, and the provision of the necessary staff and resources to do the job.

The accompanying discussion on off-street parking forms part of Chapter 5 of "Parking Manual" (copyright 1946, American Automobile Association), and is reprinted here by the express authorization of the Association, by LeVerne Johnson, traffic engineer of the AAA's Traffic Engineering and Safety Department. All illustrative material is used through AAA cooperation, with special caption credit to sources of origin other than the Association.

THE DEMAND FOR PARKING is so great that every well-located space is used, sometimes to the detriment of the primary business. The parking problem of a business district will never be solved at the curb. Off-street facilities must be provided. Curb parking should, however, receive full and appropriate attention. In central business districts, the number of curb parking spaces is reduced by loading zones, entrances, bus stops, traffic, and the like.

Conflicts of Interests

Developments of a parking plan for the central business district of a city is complicated by wide differences in viewpoint and in interests. Thus, many still hold the view that all that is needed to solve downtown parking problems is better curb parking regulation. Increasing numbers of persons agree that off-street facilities are needed, but some of them think they should be provided free of charge. Operators of public parking garages and lots usually think that no free or subsidized facilities should be provided. An increasing number believe that the municipality or its official parking agency must maintain certain certain basic controls (such as proper locations; appropriate capacities; permanence of off-street parking facilities; rate schedules designed to attract long-term parkers in accord with the overall plan; design features which will prevent congesting adjacent streets; and satisfactory standards of development, appearance, service and protection). Some believe that parking facilities, even for all-day use, should be available near their places of work. Others favor giving major preference to short-time parkers in lots and garages close to shopping centers and requiring long-time parkers to use facilities farther out from the heart of the business area.

That the facilities are needed, and that they must be paid for in some manner, is obvious. Just who should pay for them, or how costs should be divided among those who receive benefits—or even who receive major benefits—present problems of a most controversial nature.

Deciding Objectives

What should an off-street parking improvement program seek to do for the benefit of the community as a whole? What is happening or what has happened in central business districts as a result of inadequate parking and terminal facilities? Can more adequate parking and terminal facilities help keep the central district of the city healthy and prosperous? How far should the municipality go toward helping the central district—toward preventing or arresting decentralization?

Cities must decide what their major objectives are going to be in dealing with the parking problem. Some of the

decisions may be hard to make, but once made, much of the present confusion will disappear regarding parking time limits, fixing parking tickets, licensing and regulating parking lots, etc. The following are some of the factors which affect objectives and on which decisions must be made.

(1) Short-time vs. All-Day Parker. How far should the municipality go in providing for each? This is a local problem and must be decided upon the basis of local conditions. Generally, cities arrange curb parking regulations so as to permit only short-time parkers in the heart of the downtown district. But are curb spaces adequate to handle the demand for short-time parking if proper time limitations are enforced? Studies earlier suggested can help to determine present and potential demands reasonably well. To what extent should off-street facilities be provided to serve short-time parkers not served at the curb?

How far to go in providing parking space for persons who desire from several hours to all day, and the extent to which the municipality should provide for such long time parking depend almost entirely upon the benefits the municipality, downtown business, and the community as a whole will derive from such a policy. Possibly the removal of the all-day parker from the streets to off-street lots warrants some municipal subsidy. The point is discussed later.

It should be emphasized that the problem of handling all-day parking and short-time parking demands are separate and distinct matters, and must be so treated.

(2) Requirements Vary With Businesses Served. Zoning Ordinance Regulations. In planning a parking improvement program which includes off-street parking facilities, decisions must be made with regard to the needs of parkers using business establishments in the area to be served.

Studies made in accordance with earlier suggestions will help indicate how far people will walk from parking place to destination, thus dictating roughly the distance range within which parking facilities should be located. However, within limits it is likely that attitudes as to "reasonable walking distance" can be modified by better understanding of economic and other factors involved. How long persons shopping in certain stores or types of stores actually park will help indicate the rates which should be imposed for various time limits in parking lots or garages.

Requirements as to desired parking time as well as to locations of parking facilities are not the same for all types of business enterprises. The problem is complicated further by the fact that shoppers may park in customer parking facilities provided by a certain establishment and then visit several other stores in the vicinity where such facilities may not be provided. Another complicating factor is that the provision of additional off-street parking space generates new or increased demand.

Few criteria for parking space requirements have been developed to date, at least on any scientific basis. However, a review of zoning regulations from some 40 cities and counties in which off-street parking facilities are required in connection with certain new or structurally altered buildings reveals what local authorities consider reasonable, or at least enforceable, in view of little or no experienced-proved criteria. A summary is given in Table 1.

TABLE 1—Summary of the one-parking-space requirements for different kinds of buildings and types of occupancy, based on a review of regulations in 40 cities and countries.

Types of Buildings	ONE Parking Space Required for each		No. of Cities Represented
	Average	Range of Middle 2/3	
Theatres, auditoriums, etc.	7 seats	4-10 seats	24
Retail Business	400 sq. ft.	300-500 sq. ft.*	8
Office Buildings	460 sq. ft.	400 sq. ft.**	
		500 sq. ft.	3
		500 sq. ft.***	
Restaurants	(See notes)	50 sq. ft.	
		100 sq. ft.	3
		5 seats	
Hotels	4 guest rooms	3-4 guest rooms	14
Industrial Buildings	3 employes	2-4 employes****	5
	750 sq. ft.	400-800 sq. ft.	4
Single Dwellings	1 unit	1 unit	11
Multiple Dwellings*****	1½ units	1-3 units	33

* Usually square feet of space devoted to sales.
** Represents all three having such requirements.
*** One per 50 square feet devoted to patron use; one per 100 square feet of total floor area.
**** Parking requirements based on number of employees and on gross floor area shown separately.
***** Represents grouping of all areas where multiple dwellings are permitted. Usually more parking space per dwelling unit is required in the higher class dwelling areas than in comparitively low grade areas.

About half of the zoning ordinances specified minimum size for parking stalls ranging from 150 to 216 square feet with a predominance at 200 square feet. (See discussion of square feet per car for attendant-parking and for driver-parking on page —.) Most ordinances requqired that parking areas be "adjacent to," "on the same lot with," or "in connection with" buildings to be served, although a few prescribed a minimum distance such as 300 feet. One zoning regulation required parking areas for industrial buildings to be not farther away than 600 feet.

In general, zoning requirements for parking spaces are more stringent in cities under 100,000 population than in larger municipalities, even though the need is usually greater in the larger communities. This situation is not surprising, however, since land is more expensive and more densely populated or more intensively utilized in large cities. Hence it is probable that the element of "enforceability" in large cities exerts an influence to ease zoning requirements below what might be desirable. It must be remembered, in formulating a zoning ordinance requiring provision for off-street parking, that zoning regulation is based on the city's

A WELL-DESIGNED PARKING GARAGE, essentially of the open-desk type, but with front elevation partially enclosed to improve appearance. In planning an improvement program which includes off-street parking facilities, decisions must be made as to the needs of parkers using the business establishments in the area to be served. the needs as to parking time are not the same for all businesses. (U. S. Public Roads Administration photograph.)

police power and that "reasonableness" must be evident.

Careful customer-survey inquiries should be made in business establishments in areas to be served by proposed parking facilities. Such inquiries are based on present parking habits and customer desires and viewpoints as to what they would do if future changes were made. These are not altogether valid measures of future demand. However, if interpreted intelligently and in harmony with other studies and future estimates (such as of street capacities and traffic densities, automobile accumulations in the area, growth and development of the metropolitan area, economic studies relating to decentralization and land use, public transportation changes) they will provide the best possible bases for estimates of needs. A study of customer parking needs made by the Hollywood, California Chamber of Commerce indicated that one parking space was needed for each $5,500 of annual retail sales. Other studies of this type could be very worth-while. If there was reasonable agreement for similar types of districts, the figure would be a very useful measure of needed parking capacity.

(3) Off-Street Loading Needs Must Be Considered. Although the need for off-street loading facilities is not as acute as the need for facilities for the parking of passenger automobiles except perhaps in very large cities, plans for off-street loading should be included as an integral part of a parking improvement program.

Before the days of the automobile when there was much less intensive demand for use of curb space, it was perhaps natural for many in building their business houses to plan for delivery and loading of goods over the sidewalk. A paved roadway was there; there was no alley—or certainly no paved alley. The only elevator was planned for use from the front of the building.

Even then, however, many progressive business heads realized that their loading and unloading should be carried on from an alley or loading bay, so that goods would not have to be carried through the establishment to storage places in the rear, customers would not be inconvenienced, their front entrance, aisles and elevator could be kept cleaner and more attractive, and loading and unloading could be done just when it best suited their business operations.

So today some places have alley shipping entrances or loading bays while others not only do not have them, but cannot provide them without very drastic physical changes. Yet in many places street loading seriously interferes with heavy traffic flows.

Under such conditions sensible steps might be first, to eliminate or severely to restrict loading perpendicular to or at an angle to the curb; second, to prohibit parking and loading on certain busy arteries during peak hours, and perhaps later at a few critical zones during the entire business day; third, to seek voluntary cooperation of businessmen in providing off-street facilities where the problem is the worst; fourth, requiring by ordinance that after a certain date any new or renovated building of at least a certain gross floor area in the central district must provide for its loading needs off the street (with certain exceptions for buildings where the type of assured occupancy will require very little curb loading, and with the rule that such minimum loading must be in non-peak hours). In some places where there are alleys generally available and where all but a few businesses have provided off-street loading facilities, there would be justification in requiring that after a certain date all business establishments shall use only off-street loading facilities for daytime loading, and that no business shall use or be served by over-the-sidewalk loading except between the hours of, say, 6 p. m. and 7 a. m.

How many off-street loading berths are needed to serve a building with a given gross floor area?

The New York Regional Plan Association, in a report "Traffic and Parking Study," proposes that one off-street loading berth of a minimum size of 10 by 25 feet be provided for the first 25,000 square feet of gross floor area for buildings designed to be used for "manufacture, storage, or goods display, for a department store, or for a hospital." One such space would serve the first 100,000 square feet, or four times as much gross floor area, in the case of office buildings and hotels. Additional berths would be required on the basis of a sliding scale.

The basis of the sliding scale is that if one berth will serve 25,000 square feet, the second berth will serve more than 25,000 square feet if the chance of a truck having to wait is kept the same as for the first loading berth. Obviously, if each berth is occupied the same proportion of the time, then the greater the number of berths, the greater is the chance of a driver finding a vacancy at any given time. Hence, if it is desired to maintain the same chance of having to wait at all times, each additional berth can be occupied a greater proportion of the time and so can serve an increasing amount of building space. As a practical example, if one loading berth will serve 25,000 square feet for a warehouse, two berths will serve not 50,000 square feet, but, according to figures published by the New York Regional Plan Association, over 80,000 square feet.

(4) How Should Off-Street Parking Facilities Be Coordinated with Major Traffic Arteries and Flow Characteristics? Inability to receive cars to be parked fast enough often causes traffic delay or even tie-up at a lot or garage. So, too, if a parking lot discharges cars rapidly in too large numbers onto an artery already carrying nearly a capacity load, delay and congestion will result.

Where attendants handle the cars, the latter condition does not happen often, however, since the delivery rate to departing customers is too slow to cause congestion. Too often delivery is so slow as to cause irritation rather than congestion. The latter condition may exist where drivers park their own cars and large numbers leave the parking facility in a short space of time.

It is important, therefore, that careful consideration be given to effects of off-street parking facilities under consideration upon the present and probable future traffic pattern.

Parking areas for the central district should be located where they are accessible to vehicles entering the business district over major streets. They should not be located immediately abutting such major streets, or at least their entrances and exits should not be so located, unless design has been so well worked out that entering and leaving vehicles will not impede traffic movement to an objectionable degree. Avoidance of traffic delays caused by vehicles desiring to enter a parking facility necessitates rapid handling of incoming cars. The checking-in system must be simple and must operate rapidly. There must be enough attendants to assure such rapid checking-in. Particularly where attendants park the cars, there must also be an adequate "reservoir" space within the property lines—a feature lacking in many parking facilities. This space need not be unproductive—much of it can be utilized when the facility becomes otherwise filled. However, enough must remain to handle the checking-out process if the same location is used for entrance and exit. Similar principles apply to a parking facility in a secondary business district, at an industrial plant, or at an outlying mass transportation terminal.

Sometimes a parking facility may be needed at a location which is far from ideal from the street traffic point of view. Where this is necessary, entrances, exits, and reservoir space should be so located and designed as to produce the best possible traffic results. For example, if an off-street area which is available for parking purposes abuts on a major street a hazardous and traffic delaying midblock left turn in entering can often be avoided by the use of a side or back street entrance. One-way entrances and exits are usually advantageous.

(5) How Far Should a City Go in Providing or Subsidizing Off-Street Parking Facilities in the Central Business District? There is no generally accepted policy as to how far a city should go in providing or subsidizing off-street parking facilities in the central business district. Each city must work out its own policy or policies on this important matter.

One theory is that all off-street parking should be provided by private enterprise. It has been rather widely held that there is no public obligation involved. Another view has been that if public parking facilities were provided the benefits would too largely accrue to much the same group day after day. This viewpoint is obviously based on the idea of major use of public parking facilities by daily workers and not on a rate schedule which would encourage short-time parking with frequent turnover. Another factor has been the existence of privately owned lots and garages—and the difficulty of working out an equitable plan as between such private and public facilities if public parking facilities were to be subsidized.

More recently there has been increasing favor for public parking lots—or for public controls over all off-street parking in central business districts. Some who have this viewpoint believe that

facilities for temporary parking of vehicles are logical extensions of facilities for moving vehicles, and hence, should be provided by or controlled by public authorities. Others believe that municipal (or official parking agency) controls are essential for reasons already set forth above. Certainly private enterprise has not kept abreast of needs in providing parking facilities—nor has a logical integrated plan resulted which meets community needs. Nor have other essential matters already set forth been satisfactorily dealt with by private enterprise.

Another development is changing thinking on this matter. Many central districts, especially in the larger cities, have been losing businesses which have moved out to sub-centers or outlying locations where real estate values are lower, where extensive parking can be provided in connection with new stores, and where stores are more accessible to their main or most-profit-producing customers.

While such decentralization is not caused entirely by parking troubles by any means, there is good reason to believe that many shoppers would still prefer to go to central district stores where there is generally a wider selection and opportunity to "shop around" if there were adequate, convenient, and reasonably-priced parking available. Hence, the provision of off-street parking places by or under control of local government at fees which do not pay entire costs plus reasonable profit may well be regarded as a warranted measure for keeping the central business district healthy. And since a healthy central district pays a very considerable part, through taxes, of the cost of operating the local government, some subsidy can be justified from this viewpoint. This point is further emphasized by the fact that often businesses which leave the central district move outside the municipal limits and hence, thereafter, pay no property taxes to help keep the municipality operating.

Here is another concept which has much merit. On the assumption that facilities for parking automobiles eventually will be looked upon as extensions of the highway and street system, the apportionment of costs of parking should be made on a basis similar to the apportionment of street and highway costs. Those who derive benefit would pay in accordance with the extent to which they derive such benefits. In other words, the principle should hold that the costs be divided equitably among these beneficiaries: users of the facilities, merchants and property owners who benefit and the city, or the general taxpayer. The relative benefits and hence the apportionment of costs, will vary with location and type of area served. For example, in retail districts the merchants and property owners generally benefit greatly from nearby parking facilities for short-time parking; in other areas where the demand is for all-day parking, the merchant benefit would be much less. It should be noted that this concept involves the payment of less than full cost plus profit by parkers without the municipality paying the entire difference.

AN ORDERLY PARKING LOT, where access is relatively easy and where any car can be removed without moving others, is shown here. Parking areas for the central district should be located where they are accessible to vehicles entering the business district over major streets. They should not immediately abut such major streets, or at least their entrances and exits should not be so located, unless the design has been well worked out.

Formulation of a sound and generally acceptable policy on allocation of parking fees is admittedly a problem which will require much time, study, and negotiation. It is, however, one of the major policy decisions which needs to be made. Additional matters closely related to this question are discussed hereafter and should be carefully considered before a decision is made.

Municipal ownership and operation of off-street parking facilities has been increasing, principally among cities of under 100,000 population. In recent years, some larger cities have taken steps in this direction. In Massachusetts, for example, a bill to authorize the city of Boston to acquire and develop off-street parking facilities for lease to private operators was approved by the legislature early in 1946. The city council of Chicago has requested from the State legislature authority to acquire and operate parking lots. Detroit citizens approved by popular vote the issue of revenue bonds for the construction of an underground garage beneath Washington Boulevard.

Nearly a third of the cities surveyed by International City Managers Association ("Municipal Yearbook," 1946) of over 10,000 population operate municipal parking lots. There were 280 cities in this category operating 570 lots with an aggregate capacity of 75,000 vehicles, an increase of approximately 35 per cent above comparable 1942 figures. In over half of these cases, land was acquired for the specific purpose of providing parking space. Others were using land which had reverted to the city through tax delinquency, parcels left over from street widening and other street improvement projects, land acquired for other purposes such as for public buildings, and in some cases land was rented to the municipality at low rates.

(6) What Parking Facilities Should Merchants Provide? If sufficient municipally controlled parking facilities were provided in central business districts, and such facilities were paid for by groups benefiting on a pro-rata basis, it would not be necessary that merchants furnish separate parking accommodations for their customers, but only that they contribute their fair share of the over-all cost. In the absence of enough suitable parking facilities merchants often find it advisable or "necessary" to provide parking facilities for their customers without municipal cooperation.

Progressive merchants are recognizing to an increasing degree that a substantial part of their sales is dependent upon easy, moderately-priced customer parking facilities within a reasonable distance of their stores. Where such parking is not available or adequate, merchants who have not recognized this customer need have seen some of their customers transfer their patronage to stores where parking privileges are extended. Sometimes these stores are located nearby, sometimes in suburban areas.

Since merchants and property owners benefit to a considerable degree from adequate mid-town parking facilities, they should be willing to contribute to the provision and operation of such facilities.

A city instituting a parking improvement program is now much more likely than a few years ago to find merchants ready and willing to assume their fair share of the burden. In fact, merchants now are often the first to recognize the need for adequate parking facilities. And in many cases they have gone ahead and provided customer parking areas before city officials have taken action. One disadvantage of merchants providing such customer parking facilities is that it reduces the pressure for a community

parking program without assuring adequate, properly located parking facilities.

(7) City Tax Declines Due to Decentralization and "Decay". Here is one major issue which the city must face. Is business decentralization inevitable and hence can nothing be done about it? Or should the city, through a program for more and better mid-town parking facilities (and of course through other means which are outside the scope of this manual), seek to prevent unwarranted decentralization and thus stabilize or even enhance central district property values? City tax returns will obviously benefit by such stabilization or improvement.

Some cities which own and operate their own parking facilities in their central business districts believe they are justified in their actions because they are protecting the major source of municipal revenue by making it easier and more pleasant for automobile users to do business in their mid-town district.

LOCATION OF AREAS

Community-wide planning for off-street parking facilities so as to produce certain desired effects on the development and functioning of a city is a relatively new concept. Most existing parking lots came into being because buildings which formerly occupied the land became so unproductive that revenues would not pay expenses and taxes and yield an acceptable profit—or because owners believed that they would get a better over-all return from their investment if the land was used for parking than from the generally marginal use of existing buildings. The razing of buildings lowered total tax assessments on such properties. Use of the land for parking purposes offered immediate cash returns with a minimum of capital investment. Parking lots thus became located in a haphazard manner, often in areas where the buildings were below standard, and frequently at a considerable distance from the retail shopping center.

The question of where to look for land for planned off-street parking in central business districts warrants most careful study. The following suggestions are offered.

A CONTRAST IN LOADING FACILITIES for produce markets. Note the excellent layout in the lower picture (Denver Market and Produce Terminal photograph), with separate pick-up and through traffic lanes, marked stalls, and the like. This view stands in marked contrast to the upper picture (U. S. Public Roads Administration photograph), with its angle parking on both sides of a one-way street that is none too wide in the first place.

Block Interiors

The interiors of business blocks are comparatively much less valuable than frontages on the same blocks. Often there are quite large areas available in the interiors of blocks immediately adjacent to business establishments which will benefit greatly from parking facilities. Such inferior areas are often used haphazardly and wastefully. By joint enterprise, property owners in developing large blocks can create a very valuable asset to their businesses in a joint customer-attracting block interior parking lot. Sometimes even existing block interiors can be developed as in figure 40 so as to provide both parking and off-street loading. A block in which the interior is used for parking automobiles and for service access has been termed the "self-contained block." Obviously it is much easier to put such a plan into effect in new developments or in cases where entire large blocks are razed and redesigned than to adapt the idea to existing properties.

In Kalamazoo, Michigan and Garden City, New York merchants have constructed show windows and suitable new entrances to take full advantage of block-interior parking lots. One merchant reported that more customers entered his store through the parking entrance than through the door fronting on the street.

Disadvantages of the use of block interiors are that frequently they are of odd shapes and dimensions and are owned by more than one individual or organization. With proper cooperation these disadvantages can be minimized. In some cases, needed property may be taken through condemnation procedure by the city. Alleys through business blocks ordinarily are controlled by the city, but their use cannot be changed without public hearing.

"Fringe" Areas

One of the early shocks in a parking study is how costly most downtown properties are which best suit short-time parking needs. In sharp contrast, land on the fringe of the high-value district is often priced at only a small fraction of even the lower range of values in the most productive district. Since low parking fees are so desirable, it is natural that much attention is given to developing such fringe areas for parking.

If there are such fringe areas quite close to main department stores and other major "parking generators," popular parking facilities can be developed there, even for short-time parkers who will generally walk a considerably less distance than long-time parkers. However, all too often such available fringe areas are too far from principal destinations to attract many short-time parkers. Examples unfortunately are numerous of such fringe parking facilities which are little used even by long-time parkers, primarily because of walking distances.

Recently much attention has been directed toward fringe parking with public transportation to replace much of the walking. Advocates point out that with this plan the parking facilities can be far enough from the high-value zone to secure land at very reasonable prices. Under favorable conditions, this plan may prove successful. However, it should be pointed out that it has been tried in a number of places (as in Detroit and by a "live" department store in Washington, D. C.), and abandoned because of lack of patronage. A Los Angeles leader made the very practical suggestion that before basing too much of a parking program on the plan, a trial parking-lot-plus-transportation arrangement be set up, experimented with to work out difficulties if possible, and studied sufficiently to find out what can and cannot be expected from the plan. Here are some factors involved:

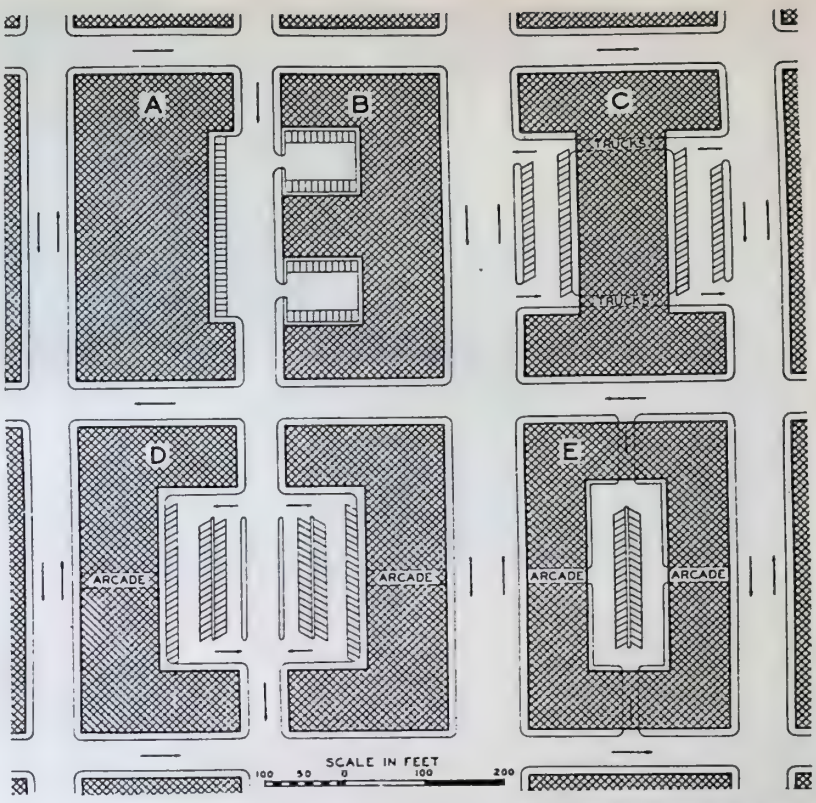
(a) The farther out such a facility is located, the smaller the section of the city it will serve. It would be neither reasonable nor desirable to expect motorists to drive through the downtown district to such a parking facility beyond and then return by public transportation to their downtown destination.

(b) Most drivers would, at least at first, react adversely to the idea of driving almost all the way to their destination and then parking and changing to some other vehicle to complete their trip.

(c) The public transportation service has to be frequent and reasonably fast. It would also be essential that the user of this combination parking-plus-transit plan be able to get on the bus or street car without too much waiting. Yet in general such facilities could not justify separate public transportation with frequent service. And buses or street cars on the regular routes would generally be most crowded in the very stretches involved in serving users of such parking facilities.

(d) The cost of parking plus two-way public transportation would have to be moderate and preferably sold as a unit, with one payment to cover the entire cost.

There is one type of parking-plus-transportation plan which has proved popular in a number of places. It involves a parking place at or very near a suburban terminal of a public transportation route providing good express service. Numerous persons living a considerable distance farther out prefer to drive their car to such a parking place (where parking is either free or very inexpensive) and use express transit service to their center-city destination.



EXAMPLES OF PARKING LAYOUTS, all except C being block interiors. Often even irregular spaces can be used to advantage for loading as well as parking. A block in which the interior is used for parking and service access has been termed the "self-contained block." It is easier to put such a plan into effect in new developments or in cases where entire blocks are razed and redesigned than to adopt the idea to existing properties.

This plan deserves much more attention in many places.

Sometimes the latter plan is referred to as a fringe-parking plan. Those who use the term are thinking of the outskirts or fringes of the city. Because there are apparently wide differences in what the term signifies to different persons, it is wise at the outset of any "fringe parking" discussion to come to a common understanding of what is meant. Generally, the term is used with reference to the outer parts or fringes of the downtown district.

Parking facilities on the fringe of the downtown district may prove an important part of the answer for long-time parkers. Moreover, the attitudes of short-time parkers may change to more favor for such fringe parking. But at present, the demand of short-time parkers is for parking within short walking distances from central district destinations.

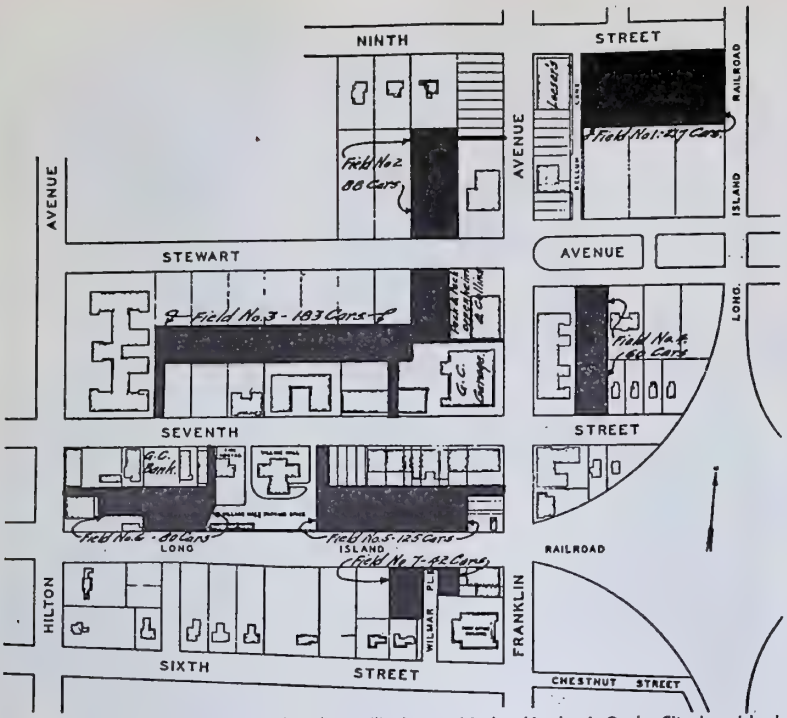
City-Owned Land

One important factor in the introduction of municipal parking has often been the availability of suitable municipally owned land. The use of such land makes unnecessary the use of city funds for land purchase. The question of subsidizing parking is not necessarily involved, for the city could include in fees charged an amount equal to what private enterprise would have to charge if it purchased that land. However, the likelihood is that such a cost factor would not be included if the city operated the parking facility. Thus, state those who favor private ownership and operation or at least private operation of parking facilities, unfair competition would be introduced by the city. This is an important problem and a difficult one —but one which must be met.

Cities have used for parking such publicly owned areas as parts of public parks, old unused rights-of-way, remnants left over from public works projects, and unused public building sites. If a city decides to provide parking facilities, one major precaution in the use of publicly owned areas is that they should not be developed for parking purposes simply because they are already owned by the city and available. They will provide little relief from parking difficulties if they are so located that few motorists will use them.

TYPES AND COSTS

The parking lot is the most common method of providing off-street parking space in the average city. Reports received from nearly 100 cities before the war indicated that 58 per cent of the total off-street parking space in these cities was in parking lots, and that these lots enjoyed 78 per cent of the off-street parking business.



LESS VALUABLE AREAS (shown in black) have been utilized as municipal parking lots in Garden City, Long Island, New York. Merchants have constructed show windows and suitable entrances to take full advantage of such block-interior parking lots. One merchant reported more customers entered his store through the parking entrance than through the door facing on the main street. (Department of Public Works, Garden City, photograph.)

Temporary Expedients

Parking lots in business districts are to a considerable extent outgrowths of the depression, having been created by the desire to remove from the tax roll non-productive buildings and to use the land during what was then hoped was a transition period for a purpose which would pay expenses with little capital outlay.

Many owners of parking lots opened as a temporary expedient are planning to continue their use for parking purposes. Nonetheless, as numerous examples indicate, if an owner of vacant private land in use as a parking lot gets a sufficiently attractive offer, he feels no obligation to maintain the parking lot and can be expected to lease or sell the land for a building. Often, as in a recent Washington, D. C., case, the parking lot had helped build up a business in the vicinity. Yet not only is this parking being lost, but the new building will further increase the need for parking. This situation must be dealt with in any satisfactory over-all parking program.

Economics of Operation

In general, the economic status of parking lots has been more or less precarious for many years. The question might well be asked: Why does not the law of supply and demand take care of downtown parking needs under private enterprise? The basic reason is that in general the use of land for parking has not produced as attractive returns as has other uses—certainly not in normal times. A great many parking lots were "forced" into operation, and the owner's immediate purpose was to salvage something from his investment and to derive enough income at least to pay taxes.

Were the parking lot business sufficiently lucrative, the law of supply and demand would operate the same as in other enterprises. Evidence that parking is not deemed the most productive type of investment is that, unlike other business enterprises, the number of parking lots in operation often declines during periods of prosperity. Buildings are constructed on former parking sites to secure greater earnings.

Costs and Investment

Data covering the cost of investment and operation of parking lots, presented in the table below, were obtained during 1939, 1940 and 1941. Wage costs have been corrected in accordance with 1945 figures developed by the U. S. Department of Labor. Table 2 is intended to give an approximate indication of what the parking fee is used for, and how much income must be to meet expenses and realize acceptable return on investment.

TABLE 2—Parking lot operating costs. Typical lot valued at $400 per car space of 170 square feet (which includes lanes for movement).

Item of expense	Annual cost per car space	Per cent of total
Taxes	$10.00	15.4
Wages	23.00	35.4
Maintenance and Miscellaneous	8.00	12.3
6 per cent return on value	24.00	36.9
	$65.00	100.0

Note that out of each dollar spent by customers for parking 63.1 cents went to pay operating and fixed expenses, and the remaining 36.9 cents represented return on investment. The figures also indicate, assuming they are representative, that each car space must take in 21 cents per day in order to pay operating and fixed expenses plus 6 per cent return on over-all value. The value of the average parking lot is made up primarily of land

The improvements, for the most part, are inexpensive and meager. However, with more control over the physical appearance of parking lots, which is generally needed and which is discussed in the next few paragraphs, parking lot costs can be expected to go up to some extent.

Because of the generally few improvements on parking lots, no depreciation or obsolescence figures were included in the above computations.

For 300 full days operation a year, each space must take in 21 cents daily.

Municipal Control

The question of the extent to which the municipality or its parking agency should control locations, permanence, operation including schedule of fees, type of service and protection offered, and the physical appearance of privately operated parking lots, is one on which it is essential to the parking program that suitable policy decisions be made. Thorny problems are admittedly involved.

There is ample evidence in most cities that private enterprise has not produced a proper distribution by location of adequate parking facilities. Likewise, the lack of permanence of private parking lots is or should be cause for real concern. Rate schedules generally fail to encourage short-time parking even in locations where that is the greatest need. Many parking lots are classed as "eyesores" because of their unkempt appearance.

Some operators have been criticized because of makeshift methods of operation, particularly with regard to abuse of cars such as denting of fenders. In all too many cases these criticisms are justified. In large measure the reason is that the parking lot has been considered a transitory use and little attempt has been made to encourage high service standards or to pay the costs of improving appearance. The various aspects of the original question warrants discussion.

(1) **Control of Location.** The development of a satisfactory community parking program demands proper locational distribution of adequate parking facilities. The Washington, D. C., Parking Agency is approaching the problem on the basis of developing factual data as to locational needs and then encouraging private enterprise to provide parking facilities to meet these needs. This approach may prove satisfactory especially if the Parking Agency keeps everlastingly active and if the municipality will use its superior powers where needed to assemble and purchase adequate sites then to be sold or leased for private de-

velopment and operation. In the contract for such sale or lease, requirements can and should be inserted to assure proper answers to the basic question under the heading above: "Municipal Control of Parking Lots."

Another approach is for the municipality or its parking agency to make locational and capacity decisions and to purchase all such sites for resale or lease as above discussed.

(2) Assurance of Permanence. The problem of assuring permanence applies mainly to parking lots because it is usually not feasible or economically justifiable to put a building designed as a parking garage to some other use.

There is reasonable assurance of permanence if the parking lot is owned or controlled on a long-time basis by a merchant or merchant group fully aware of its beneficial effects on business. Otherwise, however, it seems that the only assurance of permanence will come from municipal ownership or long-time lease of the property. Then the land can either be developed and operated by the city or its parking agency as a parking lot, or it can be leased for private operation to assure such permanence.

(3) Control of Schedule of Fees. There are numerous aspects to this matter. The underlying principle is that if the community parking program is to be properly effective, there must be adequate parking facilities properly located to serve needs, available at fees which will attract parkers. Hence, undue profits must be foregone in all parking facilities in the program—though there could still be parking facilities outside the program which attract patrons willing to pay high fees as a premium for special convenience, service, etc.

Numerous parking facilities reasonably close to principal shopping centers would be included in the parking program for short-time parking. Generally, private parking facility operators set up a fee schedule involving a high first hour rate with much smaller hourly charges thereafter. Such a fee schedule discourages short-time parking. Instead, the schedule should provide a low fee for the first and probably the second hour, with either a continuance of that fee for succeeding hours, or preferably an increased fee for each hour after the second.

How are such fee-schedule problems to be solved with private operation? To date, most parking lot operators have not shown willingness to solve them on their own initiative and for good reasons from their viewpoint (such as keeping at a minimum the number of attendants required throughout the day, and making maximum possible profits). Again it seems that either there must be a customer service motive by merchants such as in Oakland, or the municipality must find a way to impose controls. The plan of purchase of the land by the municipality or its parking agency with contractual requirements in case of sale or lease to private operators seems to be the most reasonble yet developed. There has also been some consideration of putting all parking into a public utility category and so subject to controls by the municipality.

SUCH "BLIGHTED AREAS" frequently border downtown districts. Often such areas are near enough to business establishments to be used for parking, particularly for all-day parkers who will walk farther to their destination than will shoppers. Parking on the fringe of the downtown district may prove an important part of the answer for long-time parker. Demand of short-time parkers is for parking within short walking distance of destinations.

Standards of Operation

If parking lots are to become permanent features in central business districts—and it is certain that they (and parking garages) are if the parking problem is to be solved—they should present appearances in keeping with surrounding properties and operating standards should be high enough to encourage motorists to use them. As has been the history of other operations which affect the public welfare, it is inevitable that some controls be established.

Some of the control factors which should be considered are the following:

Grading and Surfacing. All areas should be graded and surfaced with some dustless material. In some cities dust-abating chemicals must be used for certain surfaces.

Fences or Barriers. All parking areas should be required to erect suitable permanent fences or barriers, such as of

AN ORDERLY, WELL LAID-OUT PARKING LOT, photographed when vacant to show layout features better. Note the "herringbone" pattern for parking which conserves space, fencing to reduce theft, and the lighting equipment. Stalls are wide and easily accessible. Where motorists park their own cars, parking space will be used with greater efficiency if stalls are defined and barriers erected. (Schuster's Department Store, Milwaukee, photograph.)

A "GOOD" PARKING LOT has many advantages, both from the standpoint of appearance and operation, over a "bad" one where several cars have to be moved in order to get the desired one off the lot. There would accrue to the patron many benefits to the requirement (if legal basis could be found for such a regulation) that cars be parked not more than "two deep," so that not more than one car must be moved to get any other car out of lot.

masonry or steel, where lots abut on streets or other open areas. Such treatment need not be expensive but it adds greatly to appearance and removes one of the major objections to parking lots by persons interested in improving the appearance of the business district.

Entrances and Exits. City ordinances already in effect ordinarily include regulations with regard to curb cuts and driveways. Maximum widths permitted generally range from 16 to 35 feet at the curb line. Single lane entrances should be at least 14 feet wide at the property line, and exits should have a minimum of 10 feet. Both should, of course, have suitable curb returns. A combined entrance and exit should be at least 26 feet wide at the property line.

Signs. Signs of adequate size should be posted at all entrances, and they should be provided with proper lighting if the lot is to be used at night. Figures denoting fees should be plainly visible from the street, and wording which sets forth periods during which such fees apply should be equally visible. A minimum height of six inches for figures denoting rates is suggested.

Lining or Marking of Stalls. The lining or marking of parking stalls ordinarily is not required on parking lots. Where experienced attendants park patrons' cars it is not essential. However, where motorists park their own cars, parking space will be used with greater over-all efficiency if each stall is carefully defined and bumper or wheel barriers erected. An effective use of barriers both for defining stall limits and for protection to cars parked in an adjacent lane is shown in one of the figures.

IN SOME CITIES plans for parking lots must be submitted to the director of public safety before a license can be granted. In order to assure compliance with regulations with regard to minimum aisle and reservoir space, a Philadelphia ordnance requires that, when a lot is filled to its "licensed" capacity, a sign (similar to the one here) be placed at the entrance reading "Filled." Parking lots should be operated for convenience and safety.

Reservoir and Aisle Space. The provision of reservoir space for cars waiting to be parked or waiting at exits for drivers to pay their fees ordinarily is not required by ordinance. However, regulations which prohibit lot operators from temporarily storing cars at the curb, or from driving patrons' cars on the public streets, have been used to induce operators to provide reservoir space within their properties.

It might also be required, at least in the contract if city or its parking agency sold or leased the lot, that a minimum number of square feet be allotted to each car, such minimum being computed to provide reservoir and aisle space. Where attendants park the cars, 160 square feet is believed a fair figure even though it is known that some lots operate on as little as 145 square feet per car. Where drivers park their own cars, 250 to 300 feet per car should be allowed. See the figures and diagrams for plans for laying out areas for parking lots.

An ordinance adopted in March, 1941, in Philadelphia requires that operators submit a plan for parking cars on lots they propose to operate to the Director of Public Safety, and that such plans be approved before an operating license is granted. In order to assure compliance with regulations with regard to minimum aisle and reservoir space, the Philadelphia ordinance requires that when a lot is filled to its "licensed" capacity, a sign be placed at the entrance reading "Filled."

If a legal basis could be found for an ordinance provision, or at least in the contract of the city, or its parking agency sold or leased the lot, there would be patron benefits to requirement that cars be parked not more than "two deep"—so that not more than one car must be moved to get any other car out of the lot. This would reduce congestion inside the lot and speed delivery time from what it is now on many lots where as many as three or four cars must often be moved to get one car out.

These suggestions are for bare minimum requirements, for it is recognized that space for off-street parking lots in mid-town districts should be utilized as efficiently as possible commensurate with reasonable convenience and safety.

Responsibility for Loss or Damage. One of the most frequent complaints of parking lot operations arises from dented fenders, bent bumpers and grills, and other minor but irritating property damage accidents occurring on the lots. In the New York Regional Plan Association's interviews with retail store customers in Brooklyn, it was found that among persons parked at the curb, but who knew there were off-street lots

"behind or convenient to the store," the second most frequent claim for not using the lots was "Hazard, damage to car, etc." Cost was the most frequent. ("Traffic and Parking Study," New York Regional Plan Association, Inc., 1942, page 73.)

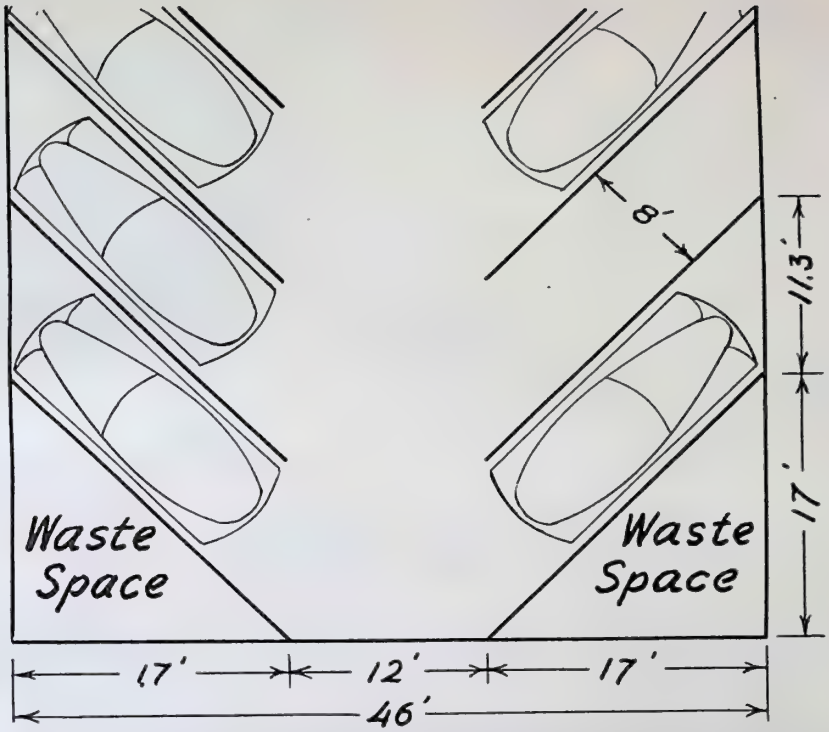
It was the general concensus among city officials reporting during the AAA parking study that lot operators should be held liable for property damage occurring on their lots, or while cars are being transferred to other lots. In some cities, the latter practice is prohibited. If transferring is permitted, it should be allowed only under proper regulation and where patrons know about it.

The question of the liability of parking lot operators in the event of loss or damage to a vehicle left in their care is determined on the basis of whether the operator or his employes are guilty of negligence. Legal negligence is the failure of the operator to exercise such precaution as the ordinary careful and prudent man would under similar circumstances.

The usual cases seem to fall into two general classes. First, where the complete custody and control of the vehicle is surrendered by the owner to the lot operator at the time that the car is brought in for parking. This situation is brought about when the car is left with a lot attendant with the keys in it. Under such circumstances the courts have generally held that a prima facie case is made out by the car owner because a car owner can hardly be expected to know what has happened to his automobile while it is in the hands of the parking lot.

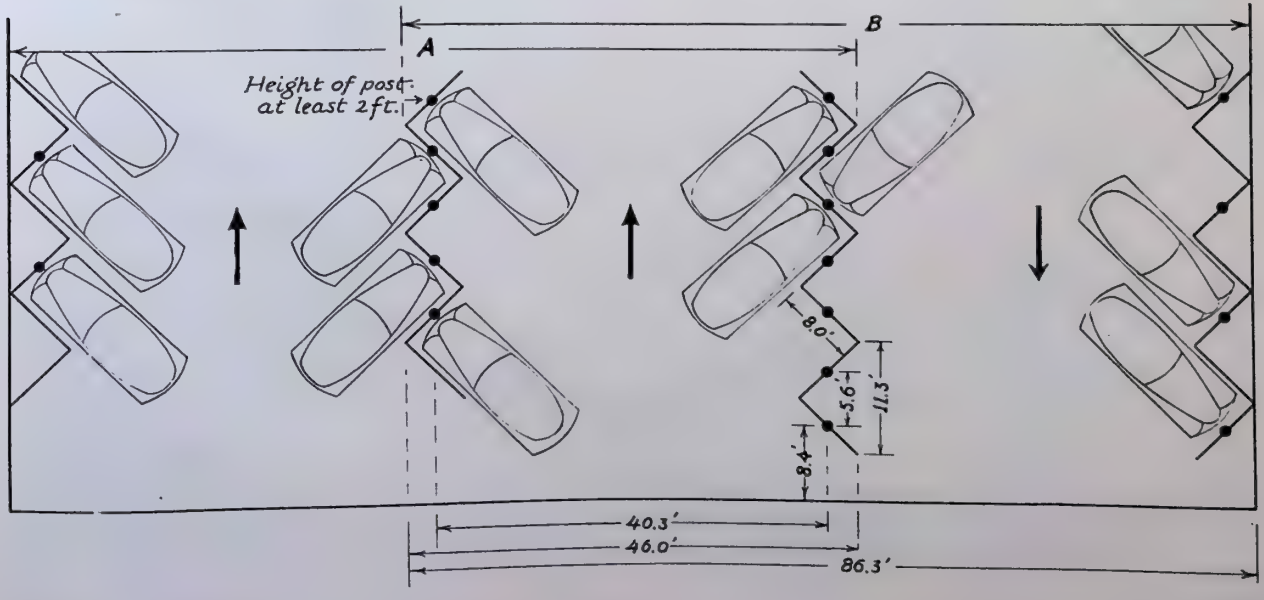
Of course, this does not mean that the lot owner will necessarily have to pay for the loss as he is not an insurer of the car. The lot owner may put in evidence to show that he exercised ordinary care and then a decision is made by the court or jury as to whether or not ordinary care was exercised.

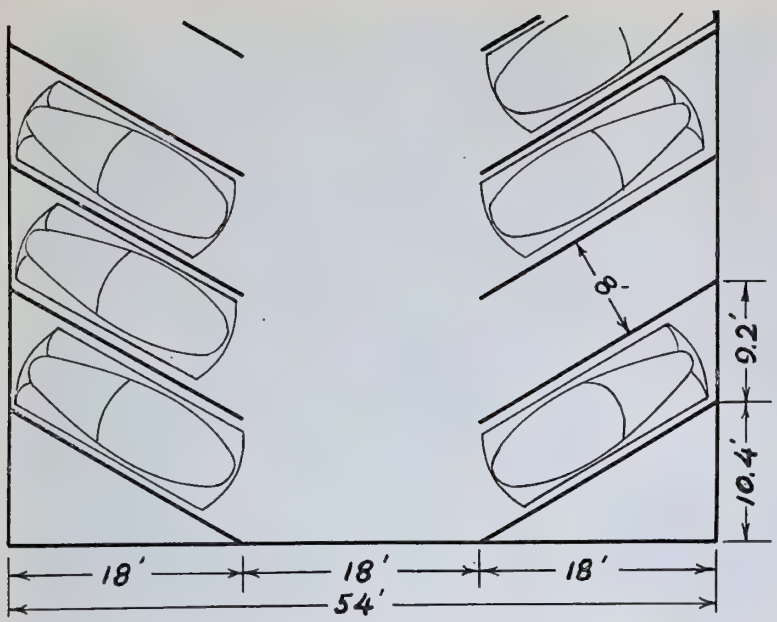
The second class of case usually involves a situation where a car owner merely rents a parking stall, where he may park at any time, driving the car himself and where he may lock the vehicle and retain the keys himself. In this instance the facts above



PARKING LOT LAYOUT, PLAN No. 1: Two rows of cars, 45 degrees, self-parking, 280 square feet to the car. The drawing shows only enough of the pattern to give the necessary dimensions. Parking at a 45-degree angle is not as economical of space as at 90 degrees. However, it is easier to get in and out of the 45-degree stalls. In this and the following plan figures, the space indicated for each car indicated includes aisles and waste spaces.

PARKING LOT LAYOUT, PLAN No. 2: Herringbone Pattern, 45 degrees, self-parking, 270 square feet to the car. Two herringbone patterns are shown—in each case by only quite limited sections. In the A plan, cars are all parked in the same direction, and cars move in the same direction in each aisle. If the aisle entered is full, the driver must leave the lot and circle the block. If the B plan had been used, the same driver could have turned within the lot and returned down the next aisle, where cars are parked in the opposite direction. There should be provision for complete one-way car circulation within the whole confines of the parking lot itself.





PARKING LOT LAYOUT, PLAN No. 3: Two rows of cars, 60 degrees, self-parking, 270 square feet to the car. If there is sufficient width available, 60-degree parking saves about 10 square feet to the car over 45-degree parking. Parking at 60 degrees often is used on plots of land too narrow for 90-degree parking, or where the turnover is considered too high for 90-degree parking. This plan is used at drive-in markets and similar establishments.

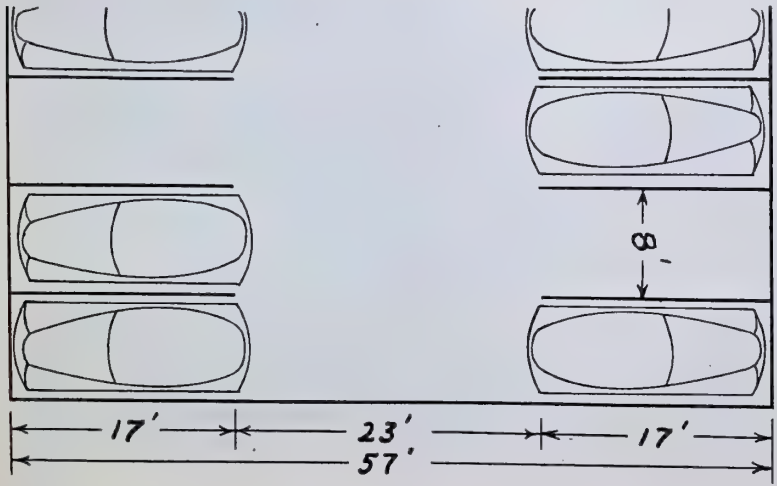
would not make out a prima facie case against the lot owner, and the owner of the car would have to prove that the lot operator did, or failed to do something that the ordinary careful and prudent person would not have done in order to make the lot owner legally liable for a loss.

Loss of gas tank caps, windshield wipers and spotlights, as well as personal belongings left in the car, have often been reported in complaints against parking operators. It has generally been decided that a lot operator can be held liable in such cases only for regular accessories to the car.

If the city should provide open and unattended space for public parking and there should be some loss or damage to a parked automobile, there would, under usual circumstances, be no liability on the part of the city.

The practice of accepting cars for parking on lots up to some early hour in the evening and then permitting all employes to leave the lot unattended, without the knowledge of car owners, is one which should be prohibited. In many cities, operators must post a sign indicating when attendants go off duty, and to the effect that cars accepted after a certain hour may be locked and the keys retained by the drivers. Where cars are accepted for all-night parking on open lots and attendants are not on duty throughout the night, this same regulation about posting a sign, etc., should hold; or if the keys have been retained by the lot operator, he should be held responsible for locking cars to remain all night.

PARKING LOT LAYOUT PLAN No. 4: Two rows of cars, 90 degrees, self-parking, 224 square feet to the car. Parking at 90 degrees is the most economical of space because there is less waste space. Hence, where land is expensive and the rate of turnover does not justify angle parking, this plan is recommended. It is used almost exclusively in garages because of the high square-foot costs. The plans for laying out parking lots must be flexible.



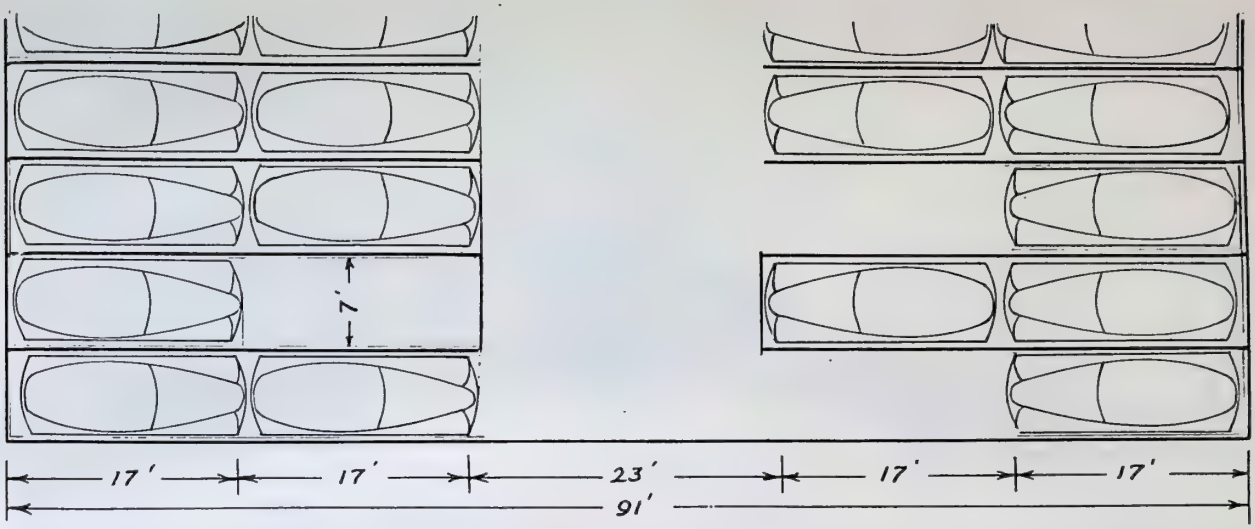
Bonding of Operators. In some cases, even when parking lot operators are legally held liable for loss or damage occurring on their lots, such losses cannot be recovered because the operators are not financially able to meet terms of judgments. For this reason, it is advisable to require that operators file a surety bond for a certain sum to insure payment of claims. In Detroit, one of the requirements to be met by operators before a license is issued is the filing of a surety bond.

Philadelphia's Parking Lot Ordinance requires that "operators or maintainers of open air parking spaces or garages," after they have defaulted in compliance with final judgments arising from losses or damages on their properties, furnish a two-thousand-dollar bond as evidence of financial responsibility. The operator's license is suspended after the operator has failed to satisfy judgments within a 15-day period, and remains suspended until "said judgment or decree shall have been satisfied or record and satisfactory evidence of the financial responsibility of such owner . . . shall have been furnished to the Director of Public Safety."

Claim Checks. On public parking lots where fees are charged, operators ordinarily are required to issue at the time a car is accepted, a claim check numbered to correspond with a stub which is attached to the parked car. In one city reporting during the AAA parking study, it was required that claim checks be dated, have the driver's name and address, time when the car was accepted for parking and when it was removed, and that all claim checks including stubs be filed with the police department. In one other city it was required that claim checks for a given day be filed with the police department by 9 a. m. of the following day. In several cities it was required that claim checks be kept available for inspection for a minimum period of time.

Some of these requirements are believed too stringent. They require more time and bookkeeping than they are likely to be worth, considering the importance of rapid parking and delivery at most parking lots. It is generally believed that operators should record on the claim check (1) the license number of the car, (2) date, and (3) time the car was accepted and removed. A suitable time clock will record date and time quickly and easily. If a driver calls for his car but has no claim check, he should be required to identify himself and to sign for the car's release. It might not be too great a burden to the police department or the parking facility operator to require that signed carbon copies of releases of cars to persons not having claim checks be filed each day. Uniform release forms might be prepared for use by lot operators.

Regulations do not usually require



PARKING LOT LAYOUT, PLAN No. 5: Four rows of cars, 90 degrees, attendant parking, 159 square feet to the car. Ninety-degree parking is the only plan shown where parking is done by attendants. Lines defining stalls as shown in the drawing are an advantage in maintaining orderliness so that cars in the back rows can be moved in and out without damaging the remaining cars. If parking lots are to become permanent features, they should present appearances in keeping with surrounding properties and operating standards should be high enough to encourage motorists to use them. As with other operations, some controls must be established.

that cars parked on a weekly or monthly basis be "checked," but that some permanent identification card be issued to correspond by number with a marker such as a metal license plate attachment or windshield sticker attached to the car. The identification card is then a permanent claim check.

Operating Licenses. A majority of the larger cities and many smaller ones require that operators of public parking lots obtain a license. Some department of the municipal government such as the police department, department of public safety, or traffic or city engineering department, usually examines the licensee's application and makes an investigation of the accuracy of statements made, including an examination of the property. After requirements have been met and the prescribed fee paid for, the license is granted. In some cities it is necessary to obtain an occupancy certificate under local laws. In some, approval by the fire marshal is necessary.

License costs in cities from which information was received during the AAA parking study varied from no charge to $100 flat rate. In many cities the license fee is based on the area of the lot, or upon car capacity.

In view of the scarcity of off-street parking space at fees motorists are willing to pay, and in view of the relatively small revenue derived from license fees from parking lots, it is recommended that license fees be no greater than costs incidental to their administration. It is manifest that high license fees ultimately are passed on to users, and thus tend to decrease parking lot use, and discourage private capital from entering the field.

Parking-Area Layout

Five figures are here given to show the plans for parking lot layouts with dimensions for stalls and aisles for 45, 60 and 90 degree angle parking where motorists park their own cars, and for 90 degree parking on lots where cars are parked by attendants. No arrangement other than 90 degrees is shown for areas where attendants do the parking because in general under this plan 90 degree parking offers the most effective utilization of the available space.

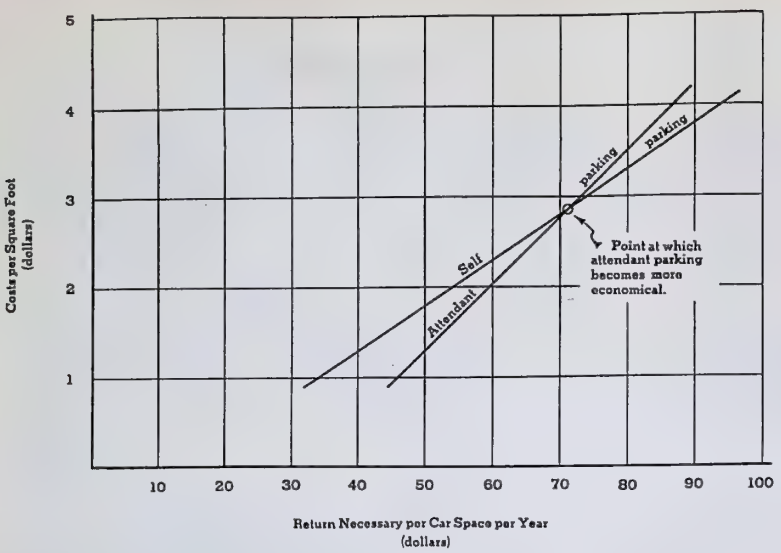
For the 45 and 60 degree angle plans it is best that there be separate one-way entrances and exits. Where the widths of the lot will accommodate three, four, or more rows of parked cars requiring two or more aisles, circulation within the lot should still be one-way but the entrance and exit can be on the same street. In such a case there must be openings between adjacent aisles. On very large lots accommodating several hundred cars, there should be openings between aisles at both ends. In other words, there should be provision for complete circulation within the confines of the lot itself, all circulating being one-way.

Plans for laying out parking areas must be flexible in order to be adapted to the wide variety of land tracts that might be found in central business districts. The following table has been set up to show some of the possible applications to areas of varying widths of each of the four plans where drivers park their own cars.

TABLE 3—How to lay out areas of varying widths, using the plans of the five layouts described in this article.

Number of rows of cars	*Plan number	Width of area	Number and width of aisles	Car Capacity** (L—Length of area in feet)
40 feet	4	1	1—23 ft.	$\frac{L}{8}$
50 feet	1	2	1—16 ft.	$2\frac{(L-17)}{(11.3)}$
60 feet	4	2	1—26 ft.	$\frac{L}{4}$
80 feet	1 & 3 combined	3	2—12 ft.	$2\frac{(L-17)}{(11.3)}+\frac{(L-10.4)}{(9.2)}$
90 feet	1 & 2 combined		16 ft.	$2\frac{(L-17)}{(11.3)}+2\frac{(L-14.2)}{(11.3)}$
100 feet	1 & 4 combined	4 4	2—13.8 ft. 2—12 ft.	$2\frac{(L-17)}{(11.3)}\quad\frac{L}{4}$
110 feet	3		20 ft.	$4\frac{(L-10.4)}{(9.2)}$

*Plan numbers refer to layouts on the accompanying diagrams.
** Formulas have not been combined because the capacity of each single row of parked cars must be computed separately to the nearest full-size stall (to avoid adding or multiplying non-usable fractional parts of stalls). Figures for each row are added, or, if identical, multiply by the number of rows.



PARKING COSTS: Self- versus Attendant Parking: Open Lots. This graph is designed to show that, for low-cost land, self-parking is preferable; while, for high-cost land, attendant parking is more economical, because the saving in space more than compensates for costs of extra attendants. If the bases used in this article are approximately correct, the critical cost will be about $2.85 a square foot, otherwise new computations should be made.

Dimensions used in the parking layout plans are minimum figures and, while it is possible to use slightly less space than is used, in many cases more liberal use of space would be advantageous. For example, on a parking lot where the length of time patrons can park is limited, or high fees go into effect after a free period, such as might be the case where parking is for customers of a store and the turnover would be expected to be high, angle parking stalls of 9 or even 10 feet might be justified instead of 8 feet is shown. Wide stalls are particularly advisable on lots where customers carry large packages to be loaded into their cars.

Number of square feet per car shown on plans 1 to 4 inclusive are approximate. Obviously, the wasted triangular areas at the ends of each row of cars parked at an angle affect the over-all space per car, and the more cars parked in each row the less is the percentage of waste. All such figures include the pro-rated share of aisles and waiting reservoirs for one car space.

Who Parks the Car?

Obviously operating expense is much higher when attendants park cars than when drivers park their own. But because considerably more space per car must be allotted for "self parking," the additional labor costs for attendants is often more than offset by high investment cost. The question then naturally arises: At what point on the cost curve does it become more economical to hire parking attendants than to have motorists park their own cars in larger spaces?

Best figures available indicate that annual labor costs per car space are approximately five times as great when vehicles are parked by attendants as when drivers park their own. However, the original investment, taxes, depreciation and miscellaneous fixed costs are higher per car space under the self-parking plan because more square feet of space are necessary.

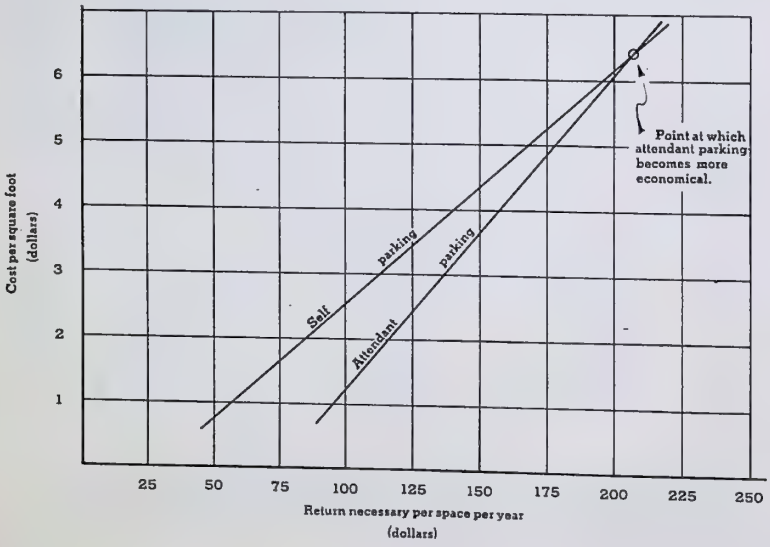
Up to about $2.85 per square foot for a parking lot it is more economical to permit customers to park their own cars. Above this cost, the annual return per car space must be greater under self-parking than under attendant parking, to pay fixed costs plus reasonable profit. (Bases for computations: Taxes, $25.00 per thousand; wages $23.00 per space per year for attendant-parking and $6.00 per space for self-parking; maintenance and miscellaneous, $8.00 per space per year, return on investment, 6 per cent; additional space for self-parking over attendant parking, 70 square feet. Attention should be called to the fact that the difference between the number of square feet allowed per car space for self-parking compared with attendant-parking determines the rate at which the cost lines shown on the graph converge. The actual number of square feet allotted per space does not change the "critical" point as long as the difference remains the same).

For a garage (including land) the point above which it becomes more economical to hire attendants to handle customers' cars is approximately $6.40 per square foot of total area. (Bases for computations: Taxes, $25.00 per thousand; wages, $57.00 per space per year for attendant-parking and $11.00 per space for self-parking; maintenance and miscellaneous, $17.00 per space per year; depreciation and obsolescence, 3.5 per cent sinking fund rate and anticipated building life of 25 years; return on investment, 6 per cent; additional space for self-parking over attendant-parking, 70 square feet.)

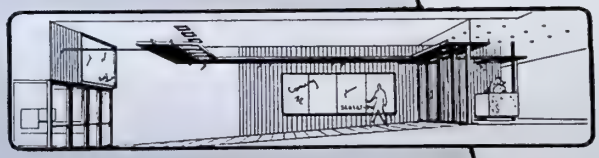
It is obvious that the above critical cost figures are rough at best, for numerous reasons. Labor costs vary with size of city, class of service rendered, and whether the garage or lot caters to short-time or all-day parkers, which reflect rate of turnover. Taxes, of course, vary with locality.

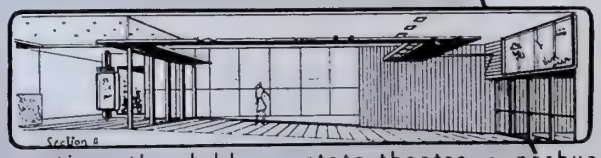
Aside from financial reasons there are other factors to consider in deciding between self-parking and attendant-parking, and there is no intent here to recommend self-parking below, and attendant-parking above these computed critical figures. Decisions should be based on careful analysis of locally current cost figures and on other factors such as any strong preferences of users of various parking facilities. For example, it is said that many women parkers do not like to drive their cars up or down certain steep ramps with the frequently sharp turns required at floor levels.

PARKING COSTS: Self- versus Attendant Parking: Garages. Self parking in a garage is more economical according to the bases set forth in this article, until the cost of the land, plus the garage, amounts to $6.40 a square foot. Above that figure, attendant parking is more economical. The saving in space allowed each car more than offsets the added costs of attendants. Aside from financial reasons, there are still other factors to be considered.



state theatre • nashua, n. h.





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1946-47

An 800-Car Parking Service for Patrons

The Fox, Atlanta, Turns Two City Blocks Into the Country's Largest Parking Lot

By virtue of its strategic position in the country, Atlanta is in reality the capital city of the southeastern United States and, as such, is a thriving metropolitan terminus. Hence, the great city of Atlanta becomes a teeming financial, agricultural, and industrial capital, as well as the center of show business. The problem of parking was forseen several years ago and, as a result of extensive study and planning, William K. Jenkins, president of Georgia Theatre Company, put an idea into reality, a majestic parking lot that will help to solve the parking problems and serve the Fox Theatre in the future.

As automobiles begin to appear on the streets in greater numbers, theatre patrons will seek convenience in parking along with their entertainment. The pioneering and enterprising spirit of the citizens of any city are what make it great, likewise, this industry. The job of providing adequate parking space for the patrons of the theatre will increase two fold in the near future. This constructive enterprise provides modern comfort and convenience, as well as a real basic asset, to the theatre and a profitable associated business.

Hon. Ellis Arnall, governor of Georgia, said, "The work that you (Jenkins) and your associates have done is but another evidence of that vision you have manifested not only in your own business activities, but in those civic matters to which you have given so much of your efforts."

Mayor William B. Hartsfield expressed his views thusly, "I think you (Jenkins) are to be congratulated for your foresight and bold pioneering spirit in providing these parking facilities around your theatre, which are to be used not only by the patrons, but by those who desire to go downtown into the congested districts by bus, after leaving their cars on your lot. Progressive business houses all over the nation are themselves providing off-street parking, and I am glad to see Georgia Theatre Company taking the lead here in Atlanta."

The vast physical layout of probably the largest theatre parking facility in the entire country is given below.

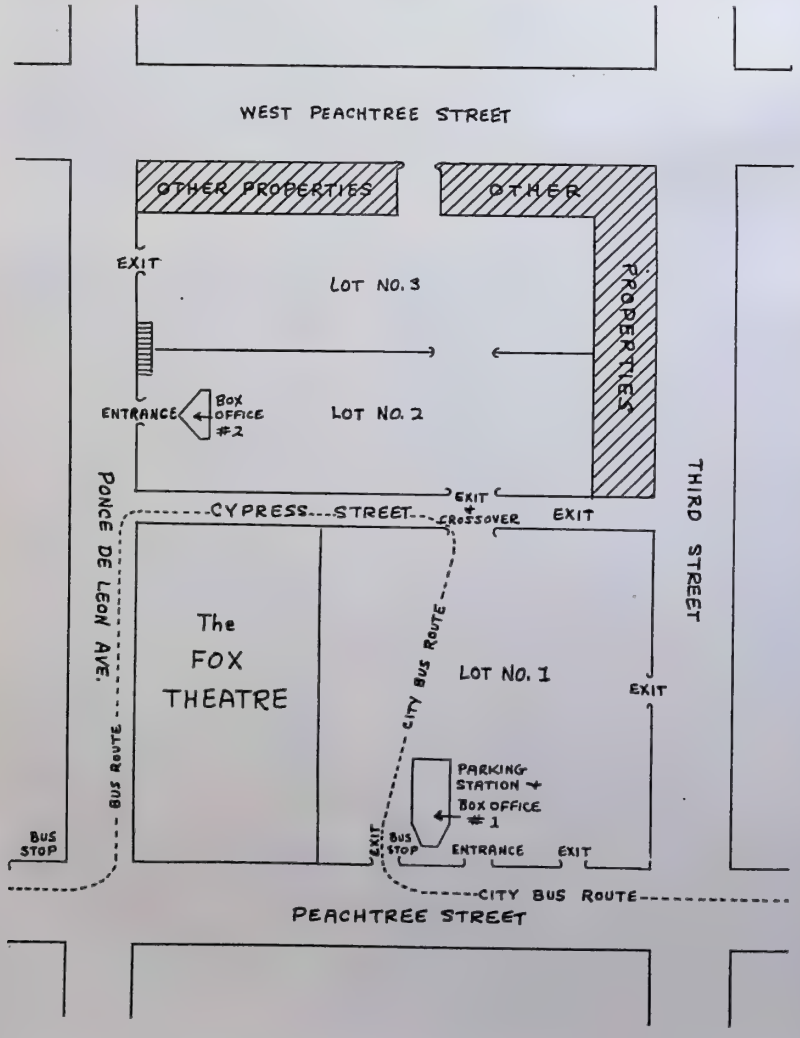
The project covers almost an entire area of two city blocks. Seventeen separate parcels of real estate were acquired and the entire area was terraced with massive granite work from the quarries of Stone Mountain. The lots are paved and surfaced. Numerous floodlights are recessed along the sidewalk curbs to illuminate the shrubbery and beautiful stonewalls outlining the entire area. The borders having been landscaped and fully equipped with the concealed lighting. Huge floodlights illuminate the lots at night.

The front lot, facing on Peachtree Street, is the principal area on which is located Box Office No. 1. This box office is a combination of several conveniences for the patrons. It is a parking station and waiting room, complete with lounges, rest rooms, telephones, etc. This station is one of the first parking stations to have a changeable marquee with attractive red letters illuminated exactly as a theatre marquee, equipped with neon and changeable letters. In the rear of this station is a garage space for six cars, for executives of the company. The entire station also serves as a Bus Stop for the Georgia Power buses, which make regular scheduled stops, diverting from its Peachtree route through lot No. 1, and around the theatre through Cypress Street then back up Ponce de Leon to the corner of the theatre and Peachtree.

The rear lots, which are connected to the front, are listed as numbers two and three. Back Lot No. 2 also has a box office for the two lots and is manned by separate attendants. Lot 2 is slightly elevated from Lot 3.

The project required almost two years in the building, accommodates 800 cars.

PLAN OF THE PARKING LOTS established by the Atlanta Enterprises, Inc., for the convenience of the patrons of the Fox Theatre in the Georgia capital. Since the theatre is out of the downtown congested area, buses have been rerouted through Lot No. 1, used in part for residents who desire to drive in this far and take public conveyance downtown. This service, however, excepts Saturdays, Sundays, and holidays, and every night after 6 p. m.



VIEW OF CYPRESS STREET, showing Parking Lot No. 2 at the left, a portion of Parking Lot No. 1 at the far right, and the Cypress Street cross-over between the two. As seen in the diagram on a previous page, Parking Lots No. 2 and No. 3 are operated as a unit, independent of Parking Lot No. 1, as it has its own box office. If desirable, Parking Lots No. 2 and 3 can be filled by way of Parking Lot No. 1, although the additional personnel required would make it desirable to open also Box Office No. 2. It is notable that, with the two box offices, either lot may be used independent of the other, whenever desirable to do so.

VIEW OF THE EXIT to Parking Lot No. 3 is here, together with, in mid-view over the top of the plantings, glimpse of Box Office No. 2, with, of course, the back of the Fox Theatre as the backdrop to the scene. Numerous floodlights are recessed along the sidewalk curbs to illuminate the shrubbery and the outlining stonewalls.

BOX OFFICE No. 2 serves Parking Lots No.1 and No. 2, which are manned by a crew separate from that operating Parking Lot No. 1. Lot No. 3 (to the left and out of the camera lines) is somewhat lower than the No. 2 Lot seen here. For the handling of patrons during the night hours, huge floodlights have been installed.

VIEW OF PARKING LOT No. 1 from the top of the Fox Theatre, looking along famed Peachtree Street. Seen at the extreme right of the picture is the rear portion of the parking station and box office No. 1, with a line of cars already occupying the spot. It is down the alley, toward which the angle-parked cars are pointed, that the buses of the Georgia Power Company buses proceed on their course through the Fox Theatre's Parking Lot No. 1. It would appear that this photograph was taken before the paving of the parking area has been wholly completed. The combined capacity of the three lots has been given as 800 cars.

LOOKING DOWN ON BOX OFFICE No. 1 shows the route of the Georgia Power Company buses through Parking Lot No. 1, as well as the convenience of the Peachtree Street frontage for patrons coming to the Fox Theatre. The Georgia Theatre Company's cinema is located to left of picture, just out of camera lines.

GROUND LEVEL VIEW of Parking Station and Box Office No. 1 show the set-up in relation to the street and sidewalk, together with some of the preparations made for the gala opening of the project, an event acknowledged by such persons as Ellis Arnall, ex-governor of Georgia, and William B. Hartsfield, mayor of Atlanta.

A Review of Recent Theatre Construction

A Pictorial Presentation of New Theatres; Textual Discussion of Construction Ideas

Expansive as is motion-picture exhibition, many a small U. S. town is without its local theatre, or with patently inadequate facilities to serve an even casual demand. The great tripartite industry has long recognized this deficiency and, despite the sometimes blinding brilliance of big-city grosses, has sought, for the benefit of all, to have its productions distributed and exhibited in even the most remote villages and towns.

Yet the while recognizing the desirability of such a concatenation of events, the industry has always been brought up hard against the inexorable fact that the capital investment that even modest theatre construction entails is not infrequently of such a magnitude as to make its consummation something only devoutly to be desired.

In 1946, when the nation was able to take a full-size breath of peaceful air, and ponder what the war brought forth which might be subsequently adapted to a commercial world, two great developments came to light as of vital concern to the prospective theatre owner: Utilization of the Quonset and of vermiculite in occupancy construction.

QUONSET THEATRES

Probably no development in the field of architectural engineering will have had, as history will eventually record it, a more significant part in bringing motion pictures to all who want them than that involving the use of Quonsets in theatre construction.

Of the Quonset—product of the Stran-Steel Division of the Great Lakes Steel Corporation—as a building material, or of its actual use in theatres, nothing will be mentioned here, this whole subject being exhaustively presented in the 24 pages starting with page 145 of this volume.

But what should be pointed out here is this: The use of Quonsets in no way cramps the style either of the prospective owner or his architect: that the Quonset merely offers a short cut in making available a semi-prefabricated auditorium box with which anything may be done in the way of facing and decoration.

From the description of Stran-Steel and Quonsets (pages 145 to 153) and from a study of the six theatres (pages 153 to 168) wherein Quonsets have been utilized, in fact or only thus far in design, it can be easily appreciated that America's present cinemaless towns have, for the first time, a chance to have their own theatre—and at a capital investment well within the scope of sound business.

When speaking of Quonsets, it must be remembered that, of the three widths of standard Quonsets, only the "40"—40 feet wide, that is—is considered adaptable to such occupancy purposes, and then only in the form known as Type B, which is made stronger by the use of 19 rows of purlins (instead of 10) and by gauge strips attached to purlins and arch ribs at their intersections.

Since the building of theatres utilizing Quonsets still is in the experimental stage, the prospective owner is urged to make doubly sure of the ability and experience of his architect—and both are urged to have no hestitancy in seeking the advice of the Stran Steel Division on any problems that arise in the adaptation of a Quonset 40, Type B, to theatre purposes.

VERMICULITE THEATRES

The second major architectural development of these early post-war years is of wide application, although it cannot be positively stated whether or not the potentialities may rival those of Quonset 40 utilization. The development concerns the use of pre-cast slabs of vermiculite concrete bolted to an erected framework of structural steel.

Details on vermiculite and its use in theatres, pertaining specifically to the Pike Theatre, in Knoxville, Tennessee, are set forth on pages 169 to 173.

In this case, the economies of construction are effected through a reduction in the costs of wall construction, since the vermiculite slabs 2½ inches thick and weighing 10 pounds to the square foot are said to be the equivalent, in insulation value, to 12 inches of brick masonry of the usual construction.

Just as the proper utilization of the Quonset demands the services of a competent and experienced architect, so does the use of vermiculite require the knowledge and know-how of the expert architect and engineer, and particularly since planning the structural steel and determining the size of vermiculite slabs are problems no novice should tackle, even if he could.

One might point out in passing that vermiculite and the Quonset are by no means strangers, for a commercial brand of this expanded micaceous mineral was used in the It Theatre (see pages 159 to 162) not only as a loose acoustic material between the Quonset ribs but also as an acoustical plaster applied over the scratch coat.

PRE-FABRICATED THEATRES

The simon-pure pre-fabricated theatres, such as was announced last year (1945 THEATRE CATALOG, pages 118 to 121), would appear to have received somewhat of a set-back with the developments in the Quonset field, but not to such an extent that it has diminished the ardor of the National Theatres Amusement Company, Inc., in bringing to reality the Crest Theatre (pages 39 to 43) in Long Beach, California. For details, the reader is referred to the pages mentioned.

MISCELLANEOUS CONSIDERATIONS

While the foregoing are definitely the top ranking developments in the field of theatre construction, a few other comments should be made on, perhaps, more general topics, although in reference to specific theatres.

In the field of auditorium acoustics, the most significant advance in many years is that utilized in the Goldman Theatre (pages 34 to 38), in Philadelphia, where Muller-Barringer advised a fabric-covered metal frame and a solid metal panel, visually identical, for attaching to the wall, thus permitting the acoustic characteristic of an auditorium to be altered and changed for the better, even after the theatre has been opened to the public.

Theatre management and operational locale also came to the fore as factors to be considered in the building of modern cinemas. Perhaps the most striking example of a theatre built to conform with a plan of management and operation is the Park Avenue Theatre (pages 44 to 48 and page 475) in New York where the whole architectural plan was directed toward achieving an operational end—although that end, however noble in purpose, was subsequently abandoned. Here, indeed, was a valient gesture on the part of management to serve magnificently the Four Hundred of New York's Eight Million.

The suiting of a theatre to a whole community—and, perhaps, vice versa, too—is not new, but it probably has not been better exemplified than in the case of the Navy Point Theatre and community (see pages 81 to 84 and pages 174 and 175), near Warrington, Florida.

CONCLUSION

The past year has truly been notable in the advances of architectural thought and the theatres that have come into being from it. Yet through it all one important fact must be apparent to even the most casual of observers: that never before in the history of architectural engineering has it been so supremely important that the prospective theatre owner and his theatre-to-be that there be selected an architect who not only knows all the details of his business and is conversant with all the latest developments and trends, but that he have, if it be at all possible, experience—and the more the better—in the exacting field of theatre design.

As developments follow developments—and those mentioned above are surely but the start, the adumbration of even greater things to come—both architect and theatre owner must come to take full advantage of the information available from the scientific and industrial research laboratories, as well as the great fund of information that manufacturers have amassed for the benefit of the users of their products.

Philadelphia's First Post-War First-Run Theatre Features a New Idea in Acoustic Technique

THE GOLDMAN THEATRE

To the country's third largest city has fallen the honor of having the first major first-run theatre of the post-war era: the new 1,400-seat Goldman Theatre in Philadelphia. Novelties of the theatre have been achieved through the adoption of the latest developments, scientific and psychologic, in every field.

The huge name sign (see picture to the left) rises to a height of 72 feet, with each letter in a different color: a pink G, white O, yellow (gold) L, green D, orange M, blue A, and red N. Each letter is hinged so that it may be swung back.

One of the lobby walls is mirrored and the others are done in bright red. The ceiling of aqua blue. The inner doors are bright red, with 1-inch square spun brass coffer pulls. The bolection molding around the doors is finished in sapphire blue.

Interior design is unique in the method of achieving the high acoustic characteristic. The effects are obtained by applying to the walls 1,190 panels fabricated from convex wood-and-metal squares, 3 feet on a side, with the central area raised 2 inches, covered with emerald green doeskin. The two lowermost tiers, through the auditorium and a comparable position in the balcony, are solid metal, painted a matching emerald green. With this method the Muller-Barringer organization has created what is believed to be the first acoustic treatment that can be revamped to correct unexpected conditions arising after the job has been finished and the theatre is operating.

Huge 6-foot "Sheaves of Wheat" wall lighting fixtures are done in spun brass.

The auditorium ceiling is done in emerald green, relieved by a 1½-inch stripe.

The carpet, with a large interlocking monogram of the letters W and G, is done in three shades of red.

The chairs are upholstered in three shades of blue: a sapphire blue in the block nearest the screen, a middle blue in the center block, an aqua blue in the rear block.

The proscenium curtain is a bright red, matching the deepest shade of the carpet. The screen, because there is no stage, is mounted on an easel set behind a gold frame and black velour shadowbox masking.

In contrast to the soft tones of the auditorium are the lively colors displayed at the rear. Acousti-Celotex tiles, one foot square, are painted in a "Bowknot in Squares" design, employing all the colors used throughout the theatre.

The staircases have walls done in three designs of "Waves of the Sea" tile, effected in three shades of blue. On the landings the tiles have a "Rope" design done in gold and white. The staircases are fully carpeted.

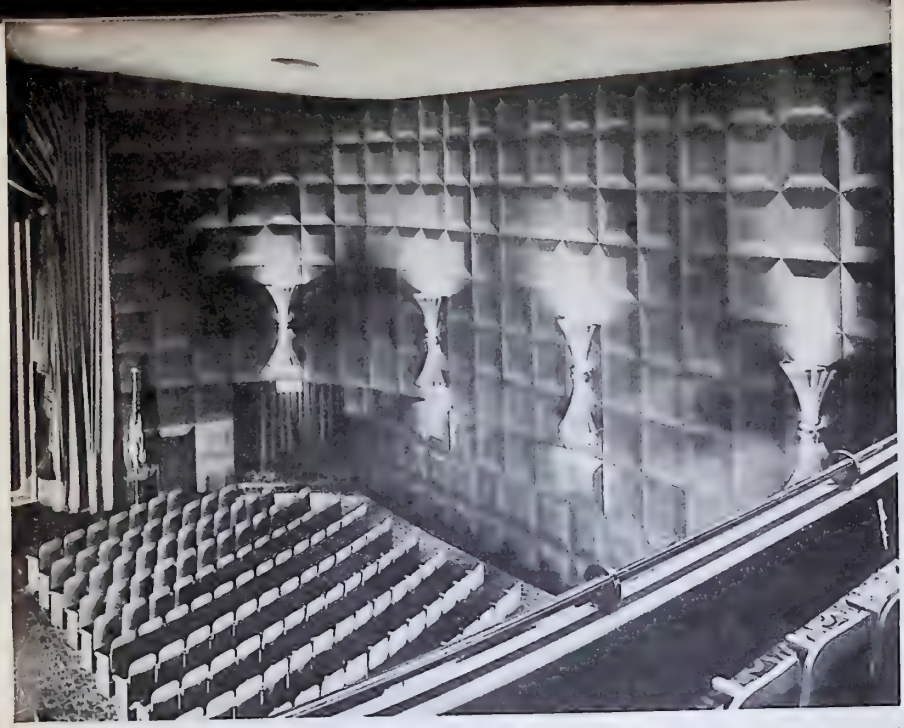
The ceiling of the lounge room is of white Acousti-Celotex mineral tile. One of the walls is of white clapboard and the others in blue "Waves of the Sea" tiles. The powder room walls are done in "Mille Fleurs" design in gay shades of red, aqua, green, and lemon yellow stenciled on a white background. The furniture is upholstered in red and green leather.

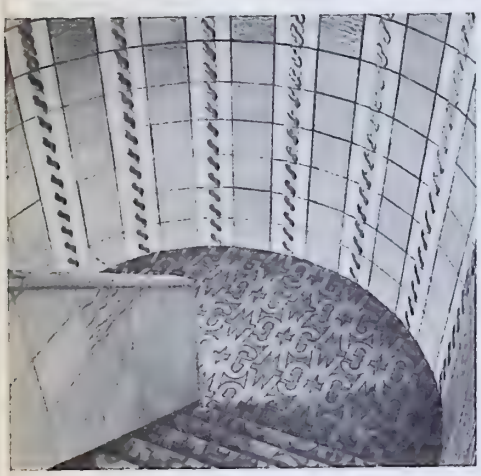
Automatic and thermostatic air-conditioning controls adjust the system in the presence or absence of crowds in various parts of the seating sections.

THE AUDITORIUM of the Goldman Theatre is unique in its acoustic treatment—a method (described further on page 37) which permits revisions when practical results are not in accord with the theoretical. There is no stage, so the screen is mounted on an easel back of the gold frame and masked with black velvet velour. The proscenium curtain is in red of a shade comparable with the deepest tone of the carpet. The design of the carpet is an interlocking monogram of the letters W and G, using three shades of red as the ground color. The chairs are of the Push-Back type, the first Philadelphia installation.

THE SEATING ARRANGEMENT, a problem at the Goldman Theatre, was arranged by using the Kroehler Manufacturing Company's Push-Back chairs. The theatre, built on the site of the well-remembered Kugler's Restaurant, was faced with the problem of maximum seating on a rather small lot, took advantage of the Kroehler patents.

THE BALCONY RAIL further carries out the Goldman theme in the supports. Ample leg and passing room is allowed between the first row of seats and the rail. The front of the balcony is well padded for acoustical effects, and faced with the same special doeskin, in emerald green, as was utilized on the 3-foot-square wall panels.





THE AUDITORIUM WALL (top) shows the arrangement of the wall panels—the two lowermost tiers painted metal and doeskin-covered frames above—with the photographic plate catching only a suggestion that it is not all of one type construction! The value of "scale" is appreciated when it is realized that the panels are 3 feet square and that the "Sheaves of Wheat" spun brass wall lighting fixtures are 6 feet high. Ceiling striping is 1½ inches wide.

THE STAIRCASES are fully carpeted, with the covering of the same design as that in the other parts of the theatre. The walls are surfaced with three types of tiles in the "Waves of the Sea" design in three shades of blue. On the landings (left) vertical rows of tiles in the "Rope" pattern are used, alternating with those of the "Waves" design. The "Rope" pattern, in gold and white, contrasts with the blue of the tile, the red in the carpet

THE POWDER ROOM (below) has walls finished in white on which is stenciled a "Mille Fleurs" design in gay shades of red, aqua, green, and lemon yellow. The ceiling is done in white Acoustic-Celotex tiles. The furniture is upholstered in red and green. The lounge in the basement of the theatre has been treated like an outdoor room with gay colors, a bay window, and comfortable seating facilities. "Waves of the Sea" is used also in the downstairs lounge walls.

REFERENCE CREDITS

THE GOLDMAN THEATRE

Philadelphia, Pennsylvania

OWNER AND OPERATOR: William Goldman Theatres.

ARCHITECT: David Supowitz, with William H. Lee, associate.

INTERIOR DESIGNER AND DECORATOR: Muller-Barringer.

GENERAL CONTRACTOR: Golder Construction Company.

SEATING CAPACITY: 1,400 persons.

ESTIMATED TOTAL COST: $1,250,000.

ACOUSTICAL MATERIAL: Acousti-Celotex mineral tiles, by Celotex Corporation.

AIR CONDITIONING: Refrigeration system, designed by Charles S. Leopold.

CARPETS: Special design, manufactured by F. Schumacher and Company.

CHAIRS: Push-Back, by Kroehler Manufacturing Company.

CHANGEOVERS: Brenkert, by Brenkert Light Projection Company.

FILM CABINETS: Neumade, by Neumade Products Corporation.

GENERATORS: Century-Roth, by Century Electric Company.

LENSES: Super Cinephor (Balcoted), f/2.0, by Bausch and Lomb Optical Company.

LIGHTING FIXTURES: Special design, manufactured by Rambusch Decorating Company.

PROJECTION LAMPS: Brenkert Enarc, by Brenkert Light Projection Company.

PROJECTION MACHINES: Brenkert (three), by Brenkert Light Projection Company.

PROSCENIUM CURTAIN: fabricated by Kaj Velden Studios, material manufactured by F. Schumacher and Company.

REWINDERS: Neumade, by Neumade Products Corporation.

RUBBER MATS: U. S. Rubber, by United States Rubber Company.

SCREEN: RCA Heavy Weight Evenlite, by Radio Corporation of America.

SIGN AND MARQUEE: by Cutler Sign Advertising Company.

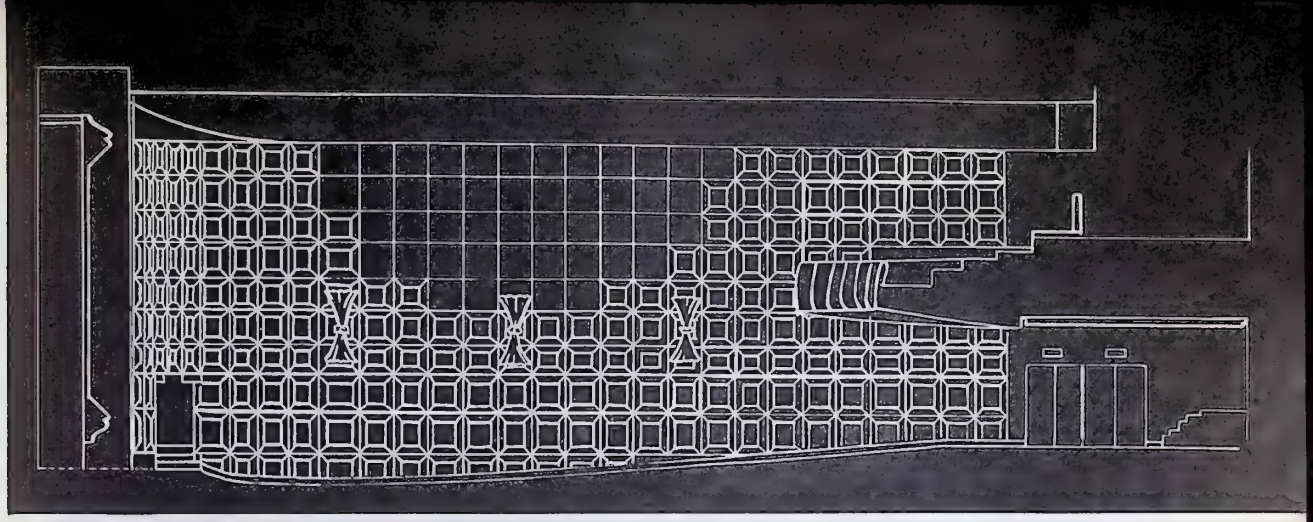
SIGN LETTERS: Wagner, by Wagner Sign Service.

SOUND: RCA Photophone, by Radio Corporation of America.

SUPPLY DEALER: Blumberg Brothers, Inc.

TICKET-ISSUING: Automaticket, by General Register Corporation.

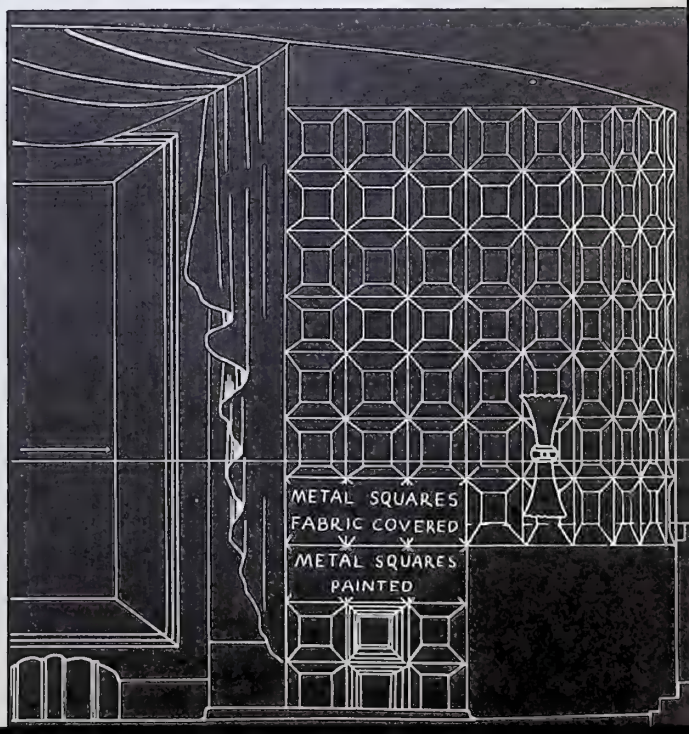
WALL TILES: by Federal Seaboard Terra Cotta Corporation.

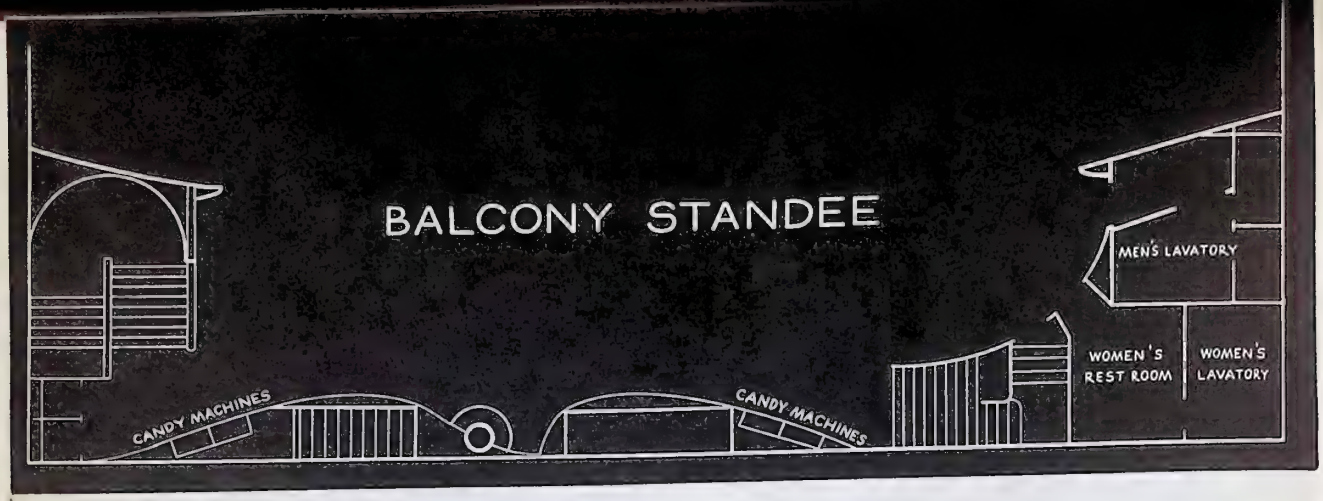


THE NORTH WALL ELEVATION (above) shows (not completely inked in) the arrangement of 3x3-foot wall panels and the placement of the 6-foot lighting fixtures. The somewhat heavy line atop the second-from-the-bottom tier shows the limit of the painted metal panels, and a similar line above the balcony shows the limit at that point. Above these lines the panels are frames of the proper design, covered with doeskin. The panels being removable, the arrangement can be changed to permit the altering of the acoustic characteristic. Below is shown the horizontal section in the same part of the theatre.

THE WALL PANELS AND LIGHTING FIXTURES are seen in closeup. The panels are convex—the concave appearance of some being strictly an optical illusion (as can be noted by rotating the page)—with the central area raised 2 inches. The spun brass "Sheaves of Wheat" lighting fixtures are two panels high, or a full 6 feet.

THE FRONT ELEVATION OF THE AUDITORIUM shows again the handling of the two types of wall panels, those of painted metal and those of doeskin-covered metallic frames. The off-square effect at the right (was well as that indicated at the left of the picture at the top of the page) is because of the curve of the auditorium wall.





THE BALCONY STANDEE SPACE, presented in drawing (above) and in picture (below), is sufficiently ample that it may well serve as a promenade. The stairway at the left leads directly to the lobby, while that at the right goes to the auditorium standee area. Candy machines are placed in view of entering patrons.

THE ORCHESTRA STANDEE SPACE, presented in picture (above) and drawing (below), has the rear wall finished in Acousti-Celotex mineral tiles, painted in the "Bowknot in Squares" design utilizing all the colors used throughout the theatre. The bleached oak standee rail is 4½ feet high, surmounted by a glass window.

The Long Awaited World's First Pre-Fabricated Theatre Opens Its Doors in Long Beach, California

THE CREST THEATRE

The plan for all-steel pre-fabricated theatres earlier mentioned (1945 THEATRE CATALOG, page 118) burst into reality early this year when the National Theatres Amusement Company, Inc., completed (after more than a year and a half of further planning and building) and opened the Crest Theatre at Atlantic Avenue and Burlington Drive in Long Beach, California.

Called by its sponsors the "theatre of tomorrow," the Crest is built entirely of pre-fabricated units of steel, with gypsum panels above the foundation. One of the interesting characteristics of the theatre is that it is put together with bolts and nuts—not riveted or welded—in such a contrived manner as to make it demountable if so desired. To comply with building restrictions, all exposed structural steel is fire-proofed with pre-cast gypsum which is bolted in place and covered with Galbestos to protect the gypsum from destructive weather. All partitions have a 2-hour fire rating, and all ceilings in the auditorium, foyer, and all others, under 25 feet, have a 1-hour rating. The partitions are supported in such a manner that they can be disengaged and taken down at any time.

The tower, rising to a height of 100 feet, is constructed of lattice steel piping and incorporates the name "Crest" in 8-foot letters. The top is constructed with galvaneal metal and has neon animation. The decorative stars on the tower's back are of metal, and are illuminated by neon and animated by a separate flasher.

The front section of the second roof deck is covered by stainless steel and lighted with a battery of floodlights. The interchangeable letter attraction sign is of special design, with neon animation.

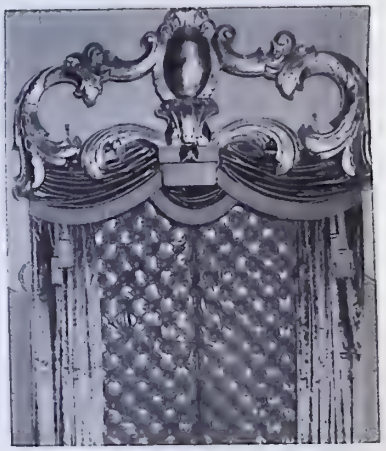
The word "Crest" appears in script letters of several rows of neon tubing, and the front wall of the theatre above the marquee is floodlighted. The soffit is decorated and lighted by neon recesses and raceways.

There are ten display frames, designed to hold 40 x 60 posters, with fluorescent tubes on all sides. These poster frames can be removed, and they have detachable plugs.

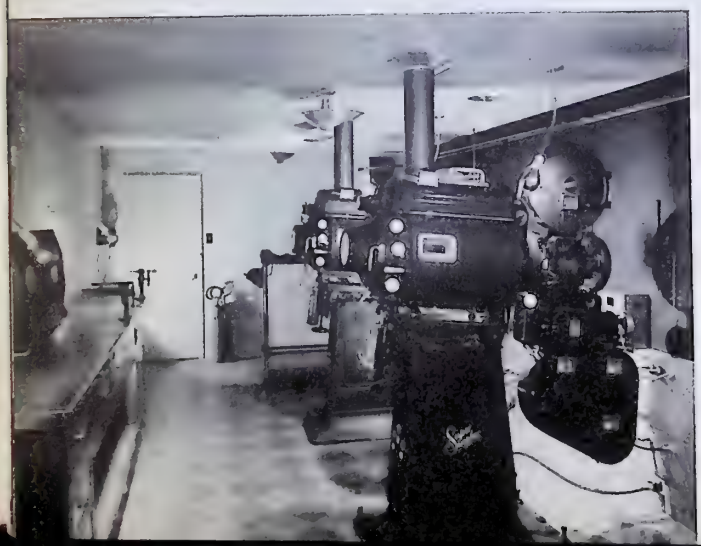
Further details of the theatre are given in the captions to the pictures, and a brief discussion of the construction will be found on page 43, alongside sketches of the orchestra and stadium floor plans and the longitudinal section.

THE TOWER of the Crest Theatre rises to a height of 100 feet and is constructed of lattice steel piping and incorporates the name "Crest" in 8-foot letters. The top is constructed of metal, and has neon animation. The decorative stars are also of metal and are illuminated by neon and animated by a separate flasher. The building front is lighted by neon recessed in flutes on the upper deck and by floodlights on the flat panels. On the marquee the word "Crest" appears in script, with several rows of neon. The soffit is decorated, and lighted by neon recesses and raceways. The changeable-letter attraction sign is of special design, with animation.

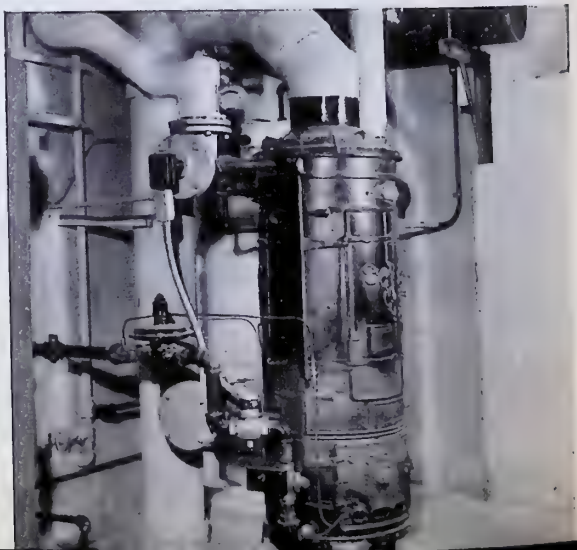
THE DECORATIONS in the Crest Theatre are entirely pre-fabricated in a studio. Upper left is a wall decoration concealing neon lighting. Upper right the lounge wall treatment. To the left is another wall decoration. Immediately below is a decorative exit door. The decorations, embossed on aluminum and shaded to give a third dimensional effect, can be removed or dismantled at any time and replaced. Aluminum panels, with snap-on molding, cover the walls in the foyer, ladies' and men's lounges, and the main lounge, as well as the ramps leading to auditorium.



THE PROJECTION ROOM EQUIPMENT includes all-Simplex projection, backed up by Peerless Magnarc lamps and a Simplex Four Star soundhead with Western Electric amplifiers. There is also a public-address system to pipe music to rest rooms and lounges. A Brenkert special-effects machine, with its rectifier, has been installed.



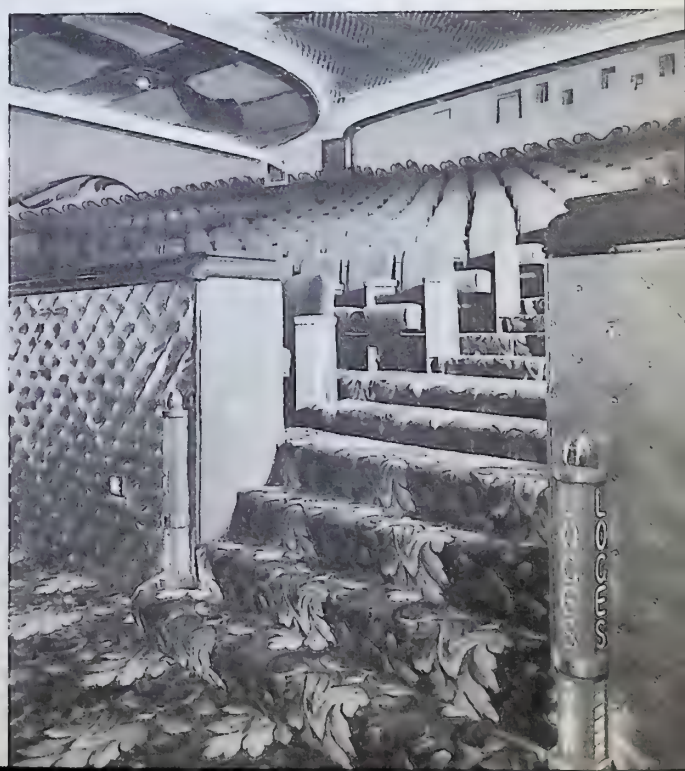
THE HEATING SYSTEM consists of two instantaneous, gas-fired hot-water heaters, with a circulating pump, connected with hot-water heating coils supplying heat through ducts to the main auditorium ceiling air diffusers. This system eliminates many hazards. The manager has full control from his office over the system.

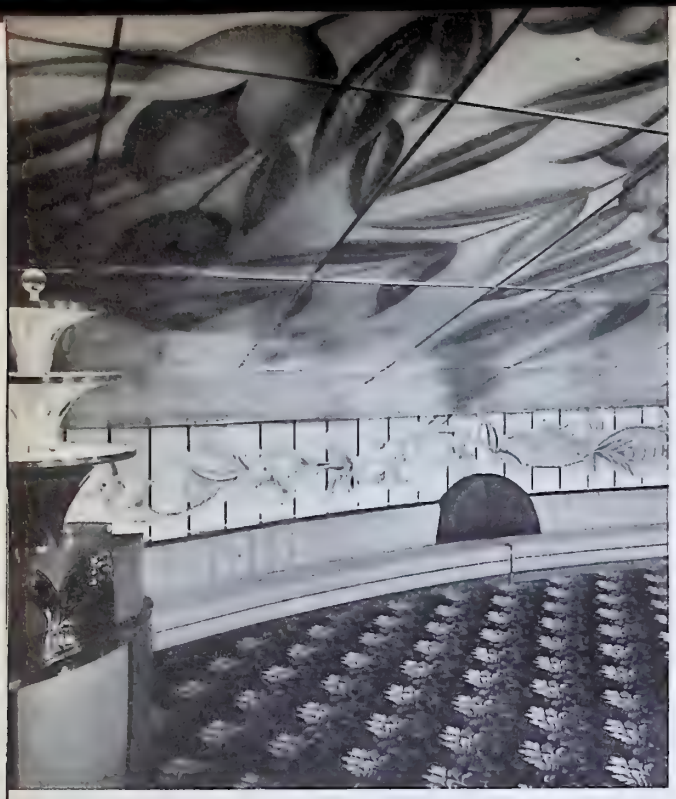


THE STAGE DRAPERIES extend across the entire width of the theatre. A special festoon curtain has been installed, also a draw title curtain. All draperies are lighted from a footlight cove, in a shield, directly in front of the stage apron. The title curtain and the front festoon are operated with motors by remote control from the projection room. The lighting is controlled by motor-operated dimmers. The theatre seats 1,164 in Push-Back chairs. The main air distributing system is accomplished by eight supply fans, four located on each side of the proscenium. There are 12 exhaust fans.

IN THE LOUNGE, the mellow light comes from a concealed neon cove built on the back of the 38-foot davenport and is enhanced by another cove light above the foyer rail. The two post fixtures are designed and made appealing by neon coves extending from the two main foyer pillars to the newel posts themselves.

A DETAIL VIEW of the loge seats shows the pre-fabricated wall of the projection booth, the walls and ceiling of Fiberglas panels, the decorations, and the floor covering. Loge and step light fixtures have been installed, and there are specially-designed neon coves on all the cross-over aisles. All lighting is concealed.





THE LOUNGE will seat 50 patrons at one time. The davenport in the center of the lounge is 38 feet long, air cooled and comfortable. On each side of the lounge convenient storage space has been provided for candy, popcorn, and the like. Lighting comes from a concealed neon cove built into the back of the long davenport.

THE LADIES' LOUNGE has two settees and five specially built cosmetic seats each of which face a mirror which is embellished with a sandblasted design. The lighting comes from a shelf from the side and from a shadow box. All lighting fixtures are of special design and contain an exhaust grille hidden in the center of the panel.

THIS PORTION OF THE FOYER shows the aluminum wall, decorations, lighting, and floor covering. The dome is flocked with red rayon, and the two neon race-ways with buff-colored rayon. The ceilings of the main ramps are pre-fabricated with Fiberglas and fire-proof leatherette. Two drinking fountains in the side walls of the foyer are deeply recessed. A convenient step enables children to reach the fountain easily at the proper height for drinking. Counters of unusual design, for candy and concessions, are directly in front of the rail separating the foyer from the lounge, convenient to the patrons.

The Crest Theatre is erected on concrete foundations which were poured in accordance with local requirements.

The structural columns are first placed on the bases and tied by the intercommunicating beams, girders, spandrels, and trusses, which form the load-carrying parts of the building. The entire structural frame is prefabricated and within three weeks of starting time, the frame definitely outlined the proportions of the theatre. The main trusses are prefabricated in the shop and made up in sections for ease of transportation. These trusses are so designed as to lock in place with bolts and nuts and provide maximum protection from earthquakes.

The roof comes next. A V-beam roofing called Galbestos is used and extra strength is afforded by the deep corrugation designed especially for wide spans. The roof is constructed of 18-gauge Galbestos and designed to carry all types of roof loads, even snow. Galbestos roofing is especially suited for speed of erection. It is long-lasting, and maintenance is kept at a bare minimum. The roof of the Crest Theatre took four men only six days to complete. Unprotected metal roofing cannot permanently withstand corrosive influences, but Galbestos removes this hazard entirely. Besides this, it is fire-resistant in every way.

Wall areas come next in the construction of the theatre. The space between the concrete foundation and the beam at the top of the side wall columns is divided by girds. The installation of all side, rear, and front wall panels is divided into two parts. First comes the placement of the 18-gauge fluted Galbestos steel, triply protected with alloys and asbestos to avoid corrosion; a perfect protection against all weather conditions.

The modern use of fluted steel for side walls at the Crest Theatre, in many combinations, causes a variety of vertical shadows enhancing the appearance of the building. Though they resist heavy windloads, all wall panels are non-bearing.

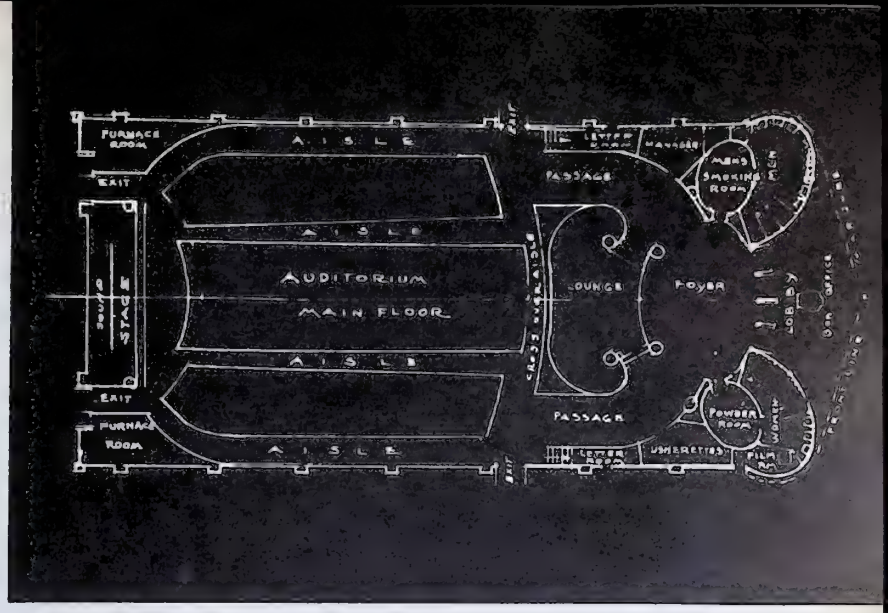
Gypsum walls now follow. In addition to being interlocked by tongue and groove, they are also securely fastened with bolts, top and bottom. These gypsum panels are reinforced with wire mesh at the time they are pre-fabricated. Eighteen hundred panels of this material comprise the walls—side, front, back—and all partitions of the Crest Theatre. A 3-inch gypsum wall, being used here, is equal to a 12-inch brick wall, or a 9-inch concrete wall, and is highly resistant to heat radiation.

The ceiling is as unusual as the other features of The Crest. Constructed of 18-gauge fluted metal with baked enamel finish, it is completely prefabricated at the mill. Erected in sections, it is not bolted into place but supported by steel brackets.

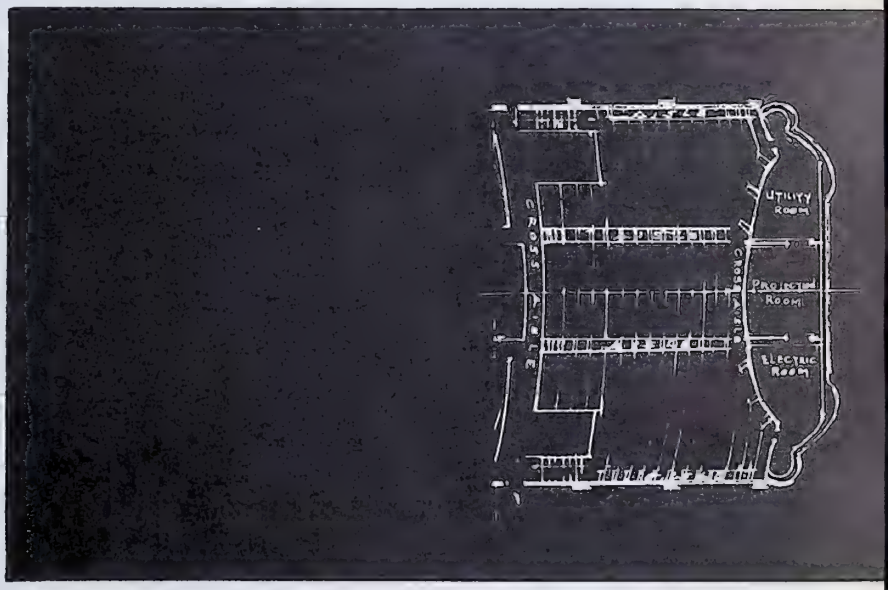
All floors throughout the theatre are of cement, as normally used in conventional construction. The stadium or elevated seat section consists of a structural frame with fluted steel of great strength. When in place, a series of hollow steel beams are provided. Erected 30 percent faster, foundation costs are reduced by this floor.

To comply with building restrictions, all exposed structural steel is fireproofed with precast gypsum, which is bolted in place and covered with Galbestos to protect the gypsum from destructive weather.

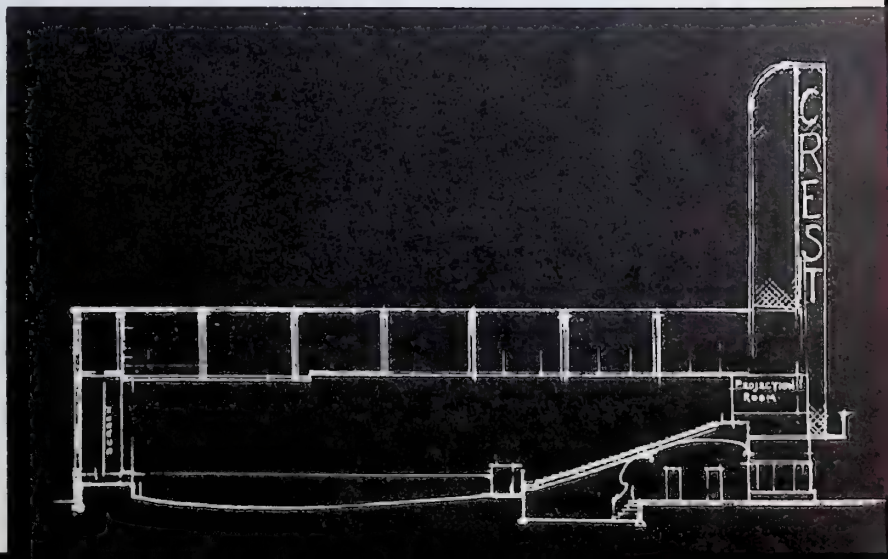
Both lounge and lavatories have spacious accommodations. Gypsum panels, interlocked in tongue and groove fashion, are used to divide these two rooms, as well as the manager's office, usherettes' rooms, projection room (front walls), air conditioning, and heater rooms. All partitions have a two hour fire rating. All ceilings in the auditorium, foyer, and all others, under 25 feet, have a one hour rating.



FLOOR PLAN SKETCHES of the Crest Theatre—the auditorium level above, the stadium level immediately below—show the architectural layout of a cinema which is 150 feet long by 80 feet wide. The striking part of the plan is the absence of straight lines—even the front of the projection booth is convex (in relation to the auditorium). The step-down lounge provides waiting and relaxing space for patrons who want to see the show from the start.



THE LONGITUDINAL SECTION shows the suspension of the auditorium ceiling, as well as the relation of the projection booth to the stadium and of both to the orchestra proper. The main trusses are pre-fabricated in the shop and made up in sections for ease of transportation. These trusses are so designed as to lock in place with bolts and nuts and provide maximum protection from earthquakes. One hundred twenty-nine tons of steel were used.



In New York, a Theatre Is Specially Designed for a Managerial Experiment Noble in Purpose

THE PARK AVENUE THEATRE

Many theatres have been built for "service to the community," but none before has ever been specifically designed for the Four Hundred of a large metropolitan area. But that is what Walter Reade did when he conceived the Park Avenue Theatre, in New York: a theatre designed and equipped to cater to a class trade in a managerial experiment truly noble in purpose.

The annual subscription plan is presented on page 475, but the physical details of the theatre, and how it was to back up this plan, are set forth in these pages. While the plan did not succeed, the theatre still stands as a monument to deluxe design and operation.

In the design, construction, and furnishings of the theatre, William I. Hohauser, architect and engineer, made everything subservient to the principles of luxury and comfort of the same order as the prospective clientele enjoys in its own home.

Instead of the usual marquee, the theatre has a simple canopy over the entrance, with the only lettering the theatre name over the entrance doors. The theatre is entered through a simply adorned lobby.

The theatre itself is divided into the orchestra and a smoking mezzanine (stadium section). The former area is equipped with couch-type theatre chairs, while the elevated portion has some 125 love seats, each accommodating two people in parlor comfort.

The downstairs lounge offers facilities for backgammon, gin rummy, or bridge, with the cards and games supplied by the management.

In the orchestra there are special rows for those confined to wheel chairs.

The ladies' lounge was supervised by a beauty technician, specially trained by Charles of the Ritz, to aid patrons in beauty problems, and supplying customers with individually-wrapped cosmetics for their convenience.

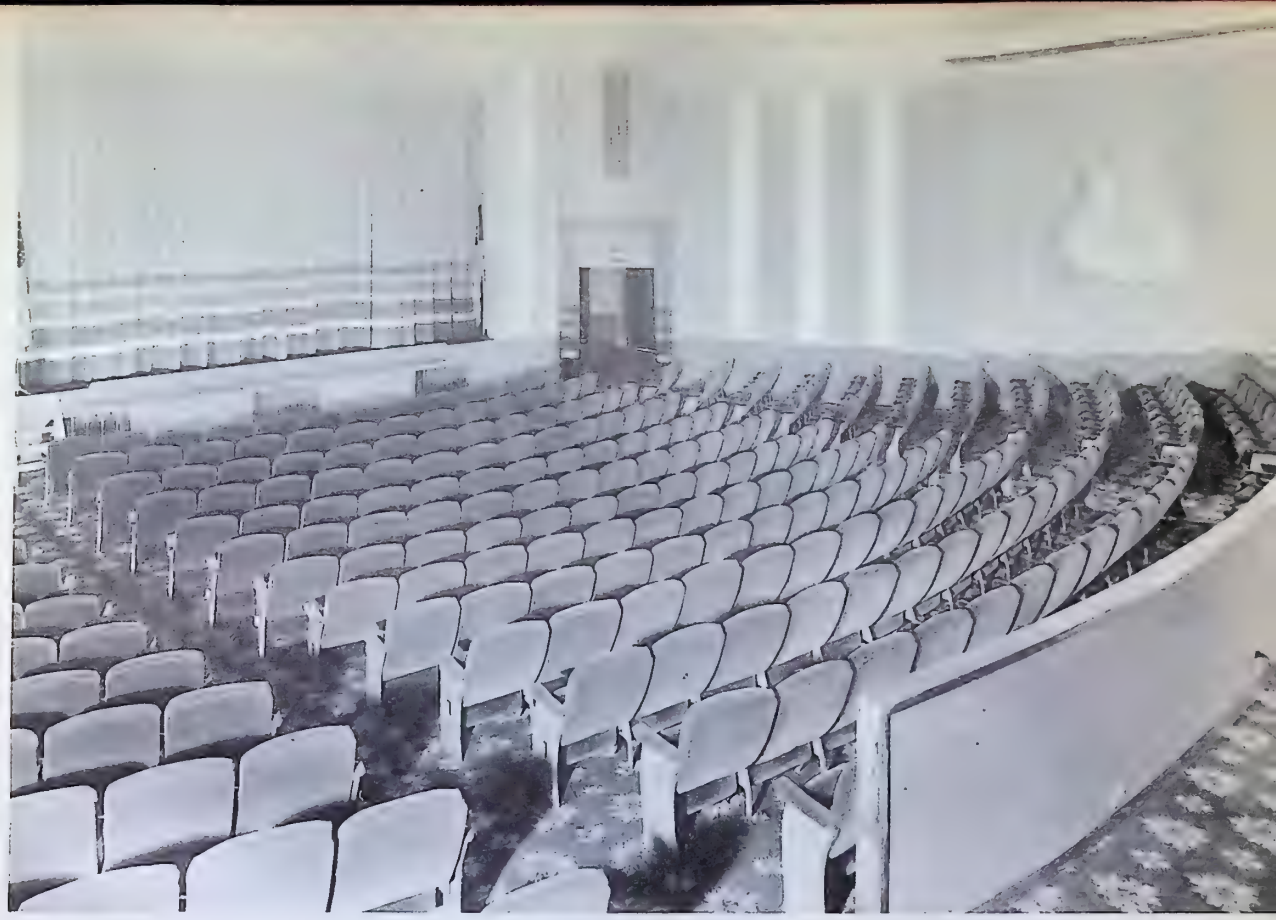
Hearing aids are provided the deafened.

Special telephone accommodations are provided so that professional men may be quickly and easily summoned.

The house is equipped with a 250-ton air-conditioning system, supplemented by Sterilamps.

There was no vending or sale of any type of merchandise in the premises, and, even for the check room (in the main lounge), no fees or gratuities were permitted for any of the theatre's attaches.

THE PARK AVENUE THEATRE was remodeled out of the former Anderson Art Galleries at 59th Street and Park Avenue in the City of New York. Instead of the usual marquee with bright lights and current attraction announcements, the theatre has a simple canopy over the entrance, the type used by most of the apartment houses along the Avenue. The only lettering on the facade is the theatre name above the entrance doors. The theatre is said the first to be designed especially for high society, with all the comforts of home, and, as originally planned, to serve its clientele on a subscription basis, highlighting the "seats without waiting" angle.



THE AUDITORIUM PROPER (above) of the Park Avenue Theatre has some 330 couch-type theatre chairs, with special molded seats and back of Foamex. The top and front of the arms are also covered with foam-rubber slabs for added comfort. On the orchestra floor, there are also several rows for patrons confined to wheel chairs.

THE STADIUM SECTION (below) is furnished with some 125 "love seats" to accommodate two people. The chairs were designed to give home-like lounge-chair comfort in the space limitations of the theatre. The frame is constructed of kiln-dried wood and, like the orchestra chairs, utilize Foamex instead of the usual padding.

ON THE MAIN STAIRCASE is the mural, "The Judgment of Mars," painted by the noted Belgian artist, Oscar Glas. It measures 60 feet long by 16 feet high. Art work dominates the theatre, for even in the lobby, instead of the usual framed posters, there are displays of various objets d'art arranged by Audubon Artists.

A CORNER OF THE LOUNGE shows the simplicity that marks the Park Avenue Theatre, a simplicity which is rich and sumptuous without the garish theatrication so frequently confused with lush decoration and furnishing. In the downstairs lounge, there has been installed a television set. Card tables are also ready for patrons.

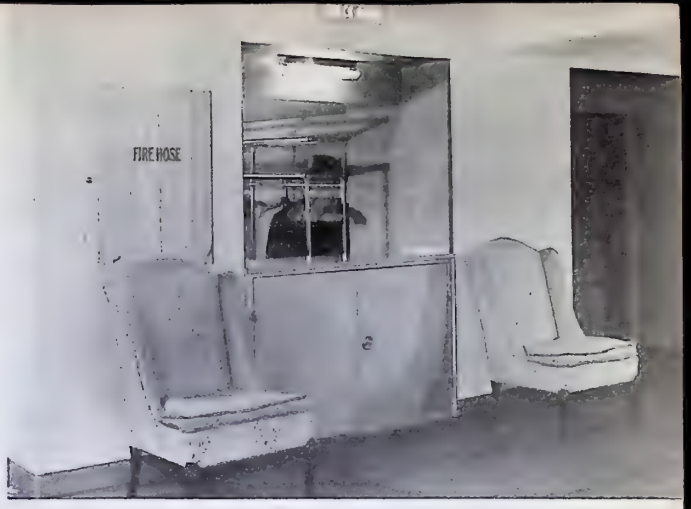
A CLOSEUP OF THE DISPLAY FRAMES set into the antique mirrored walls (by John Depp) is shown here, with the shelves carrying small pieces of statuary and figurines of both modern and classic composition.

THE UPSTAIRS LOUNGE has antique mirrored walls into which are set display frames for setting off objets d'art, including sculpture, rare jewels, ceramics, and glass, as well as paintings. Long, comfortable divans, designed to match the curves of the walls, provide plenty of relaxing space for patrons desirous of waiting until they will be able to see the complete show from the start of the programmed item. Sand urns are convenient.

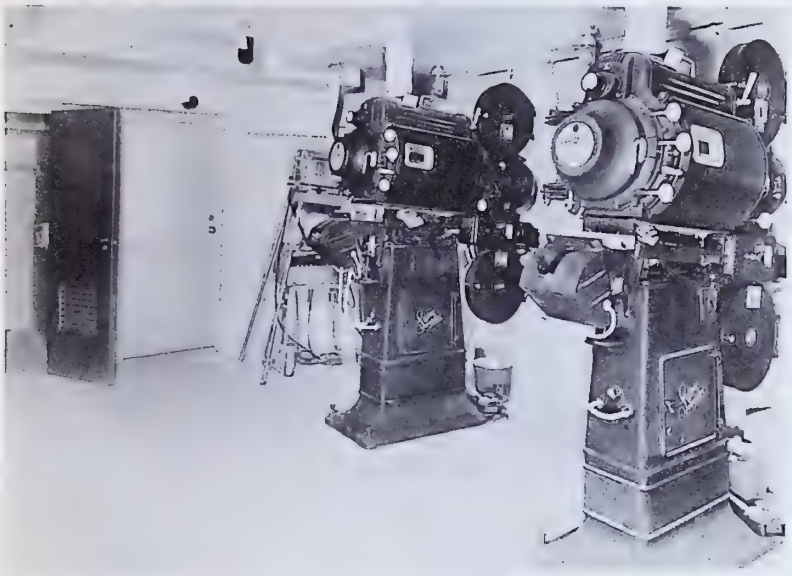
THE LADIES' LOUNGE was designed to have on duty at all times a trained beauty technician, supplied by Charles of the Ritz, to offer facials and make-up to the patrons. The walls are fabric-covered, with display tables and the make-up tables of colored glass. Powder and make-up were furnished free by the management.

THE BOX OFFICE at the side of the carpeted lobby which is done in a gun-metal gray finish, with a marble dado and gold-leaf trim. Instead of the usual posters, the display frames, about the usual 40x60-inch size, are used for the exhibition of paintings, and are deep enough also to show various other kinds of objets d'art.

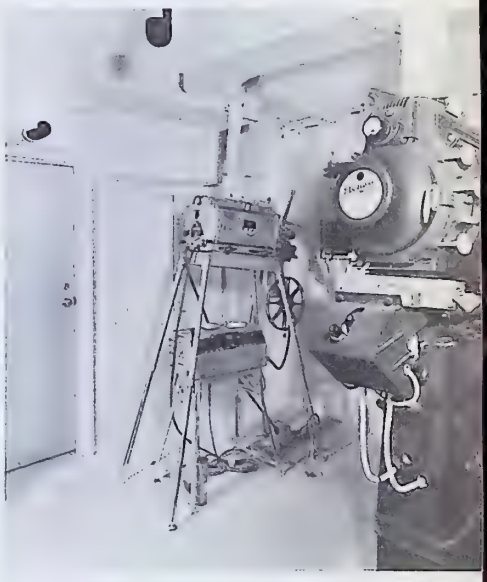
THE CHAIRS in the auditorium proper are of the couch-type of the customary seat. Instead of the wooden backs, the backs of these chairs are covered with the same fabric used on the bottoms and are lined with a thin sheet of steel before the cover is applied so that people seated behind cannot kick through the seat backs.



THE CHECK ROOM is one of the conveniences found in the Park Avenue Theatre that many a modern motion-picture theatre has long since forgot. While, perhaps, the usual run of cinemas have no call for this service, it is just another of the little things the management of this theatre kept in mind when designing the facilities.

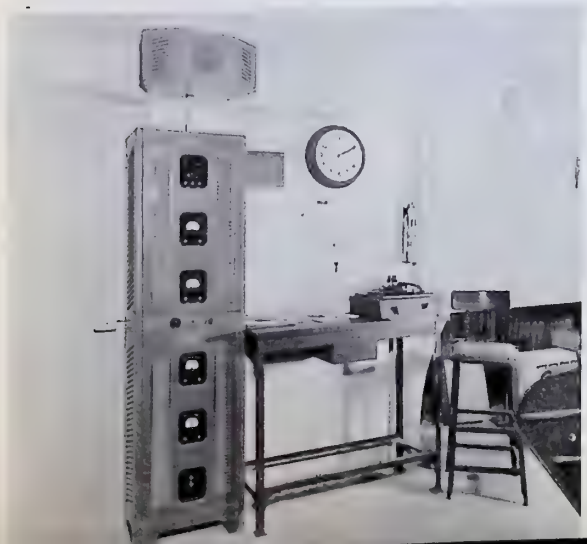


THE PROJECTION ROOM is, for the 35-mm. equipment, an all Simplex job—heavy duty pedestals, E-7 projector heads, and Four Star Soundheads. Peerless Magnarcs provide the projection lighting, and Voice of the Theatre speakers back of the screen deliver the auditory program to the customers. Where it may be needed, a 16-mm. Filmoarc sound projector stands ready to supplement the theatre's regular program of 35-mm. pictures.

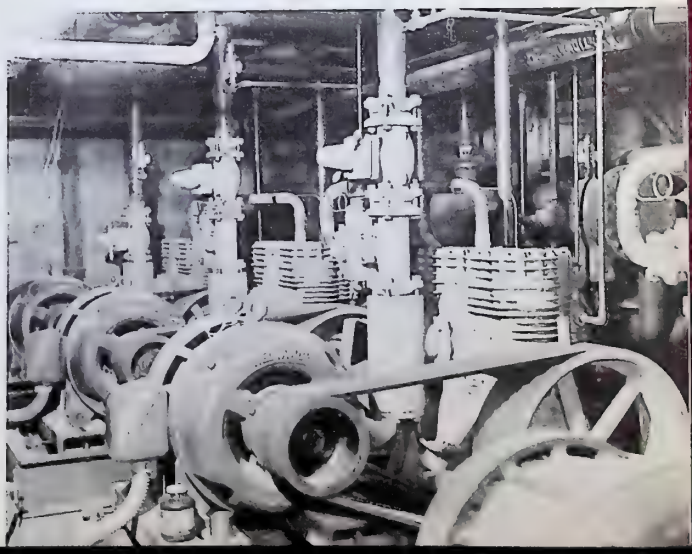


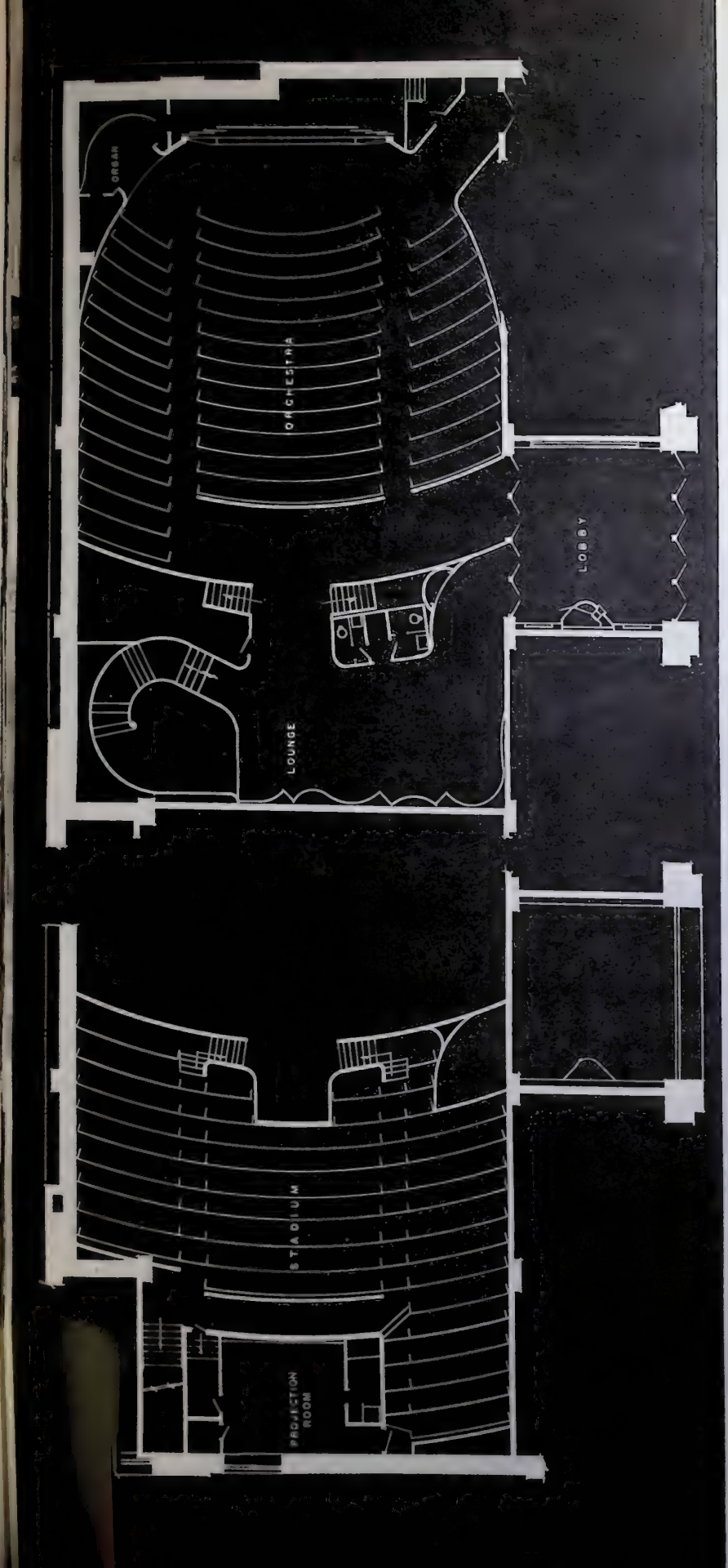
THE 16-MM. EQUIPMENT, installed to permit the use of any available film, is a Bell and Howell Filmoarc sound projector. Using its own sound system, the regular loudspeakers are the theatre's voice.

THE AMPLIFIER RACK and the monitor speaker are part of the sound installation of the theatre. Also present is a record player (not yet completely installed) that probably would be used to pipe classic and semi-classic music to the auditorium before the show, and during intermissions, and to the lounge rooms at other times.



THE AIR-CONDITIONING SYSTEM of the Park Avenue Theatre encompasses nearly 250 tons of equipment, some of which are shown here. Besides humidity control, there are germ-killing Sterilamps installed in the apparatus to rid the air of harmful bacteria. The installation is thought to be a bit large for a 587-seat house.





REFERENCE CREDITS

THE PARK AVENUE THEATRE

New York, New York

OWNER: Water Reade Theatres.

OPERATOR: Park Avenue Theatre, Ltd.

ARCHITECT, ENGINEER, AND DESIGNER: William I. Hohauser.

DECORATOR: Oscar Glas, Gertrude Rubin Jarvis, and others on special details.

SEATING CAPACITY: 587 persons.

TOTAL COST: Approximately $900,000.

ACOUSTICAL MATERIAL: Gypsum, by United States Gypsum Company; and acoustical plaster.

AIR CONDITIONING: Carrier system, 250 tons, installed by Center Air Conditioning Company; with Sterilamps, by Westinghouse Electric Corporation.

CARPETS: Custom-made, through Swern and Company; and Gulistan Super Rosebrook, by A. and M. Karagheusian.

CHAIRS: Ideal Couch, by Ideal Seating Company; and love seats, by Lehigh Furniture Company.

CHANGEOVERS: Thide, by Dowser Manufacturing Company.

COIN CHANGER: Lightning, by Johnson Fare Box Company.

CURTAIN CONTROLS AND TRACK: Vallen, by Vallen, Inc.

DISPLAY FRAMES: Custom-made, by Lobby Display Company.

DRAPERIES AND STAGE CURTAINS: Designed by Helen Paulls, woven by Creative Looms, Inc.; through Swern and Company.

FILM CABINETS: Neumade, by Neumade Products Corporation.

GENERATORS: Transverter, by Hertner Electric Company.

LENSES: Super Cinephor, Series II (Balcoted), by Bausch and Lomb Optical Company.

LIGHTING FIXTURES: through Beaux Arts.

PROJECTION LAMPS: Peerless Magnarc, by J. E. McAuley Manufacturing Company.

PROJECTION MACHINES: 35-mm.—Simplex E-7, by International Projector Corporation. 16-mm.—Filmoarc, by Bell and Howell Company.

REWINDERS: Simplex, by International Projector Corporation; and Goldberg, by Goldberg Brothers.

RUBBER MATS: through Swern and Company.

SCREEN: Walker PM, by Walker-American Corporation.

SOUND: Simplex Four Star, B-60, by International Projector Corporation; with Voice of the Theatre speakers, by Altec Lansing Corporation.

SUPPLY DEALERS: National Theatre Supply Division of National-Simplex-Bludworth, Inc.; Joe Hornstein, Inc.; and Capitol Motion Picture Supply.

TICKET-ISSUING MACHINE: Automaticket, by General Register Corporation.

TICKET CHOPPER: Custom-made, by Lobby Display, Inc.

THE FLOOR PLANS of the Park Avenue Theatre—of the stadium level (left) and of the auditorium level (right)—can best be understood by remembering that the unlabeled ell portion of the stadium portion is the upper level of the lobby, thus bringing the main stadium seating area over the lounge. It should be noted that, following a keep-to-the-left theory, egress is made into the lounge, while exiting patrons move directly to the lobby.

A Theatre and Business Development Serving Swarthmore, Pennsylvania, Is in Springfield Township!

THE COLLEGE THEATRE

Within sight of Crum Creek Valley, and the Leiper quarries which have been worked since the American Revolution, Paul J. and Ruth Carey have built a business block housing a theatre. Built of full range red Colonial brick in a modified Georgian style, the while columned front of the theatre sets back from the front line of the adjoining stores, so that the business block conforms to the suburban dignity of the community. The theatre project lies wholly within Springfield Township, since abutting Swarthmore has an ordinance prohibiting the erection of a theatre within the borough limits. Several years ago the Swarthmore Players built its theatre on ground in Springfield donated by Victor Shirer, and now the present cinema-stores project is on a parcel purchased from the very same Shirer tract!

Ground was broken for the project late in November, 1945, and construction was well under way before government restrictions were imposed on commercial building. Adjoining the development is a large Victorian stone house which will eventually house a tea room. On the other (the north) side, there is room for two more stores. At the corner of the lot is a filling station, and behind this, in the future, will be a bowling alley and recreation building.

The outstanding feature of the interior are two photographic murals, one of Parrish Hall, the main building of nearby Swarthmore College, and the other of Clothier Memorial Tower on the college campus. Measuring 9½ feet wide by 16½ feet high, the original photographs were taken by G. Harry Hladky. The pictures were enlarged in six sections by Berry and Homer.

Paved parking space for some 400 cars is provided at the side and rear of the theatre and stores, with a 25-foot wide off-highway parking space for 35 cars edging along Chester Road.

In addition to serving residents of Swarthmore, the new business center will serve the communities along Fairview Road, including Grace Park, Woodlyn, and Penn Hills. The development is also convenient to Springhaven Estates, Ridley Township, Wallingford, Morton, and Rutledge.

As the theatre opened, the subsequent-run policy was two changes a week, with a matinee and two evening shows Monday through Friday, continuous from noon on Saturday, and no Sunday showings. Adult admission were 35 cents at matinees and 60 cents at night, with children 20 cents at all times.

THE COLLEGE THEATRE is unusual in that it has no marquee, no sign work in the orthodox manner, yet this lack of patent theatricalism is what makes the house singularly appropriate to its location. Right across Fairview Road from staid Swarthmore (whose ordinances prohibit the building of a theatre) and hard by Swarthmore College (in honor of which the theatre is named), the theatre and entire development is quite in keeping with the spirit of the area. A triangular pylon surmounted by a flagpole, erected in front of the theatre, provides the space for announcing the present and coming attractions in this very up-to-date cinema.

THE FRONT, with the lights turned on in the advancing twilight, reveals the full range red colonial brick construction and the limestone trim. The classic-style entrance is further set off by the porch with its wood columns and entablature on the face of which is spread in neo-gothic letters the theatre name. While lacking in the conventional program board and sign space, the display seen at the right of the photograph is enough.

THE FOYER is built on an incline. The first idea was to have the area flat, with five "grand stairway" steps, but this plan was abandoned in favor of the ramp, for added safety. If necessary, the doorman may take his stand at the outside door rather than at the top of the incline. The side exit courts mean that the foyer is strictly an area to serve the convenience of incoming patrons without any conflict from outgoing customers.

THE AUDITORIUM, looking toward the rear, shows the presently unused spotlight port in the projection booth. The window at the left is the one in the film room. Note that in this theatre there is no standing room in the auditorium, and not too much is allowed in the narrow promenade separated from the auditorium by a plate-glass window. The foyer will, of course, serve as the standee space during the periods of peak business.

REFERENCE CREDITS

THE COLLEGE THEATRE

Springfield Township, Delaware County, Pennsylvania

OWNER: Rupaca, Inc.

OPERATOR: Felt and Kalish Amusement Corporation.

ARCHITECT: Karl F. Otto.

DECORATOR: Paramount Decorating Company; with photomurals by G. Harry Hladky.

SEATING CAPACITY: 812 persons.

COST OF BUILDING (EXCLUSIVE OF EQUIPMENT): $100,000.

COST OF EQUIPMENT (EXCLUSIVE OF AIR CONDITIONING): $25,000.

COST OF AIR CONDITIONING: $20,000.

GENERAL CONTRACTOR: Nolan Brothers.

ACOUSTIC ENGINEER: Jacobson and Company, Inc.

AIR CONDITIONING ENGINEER: George C. Lewis Company.

BRICK AND CONCRETE: A. Heston Hannah.

ELECTRICAL CONTRACTOR: Hobbs Electric.

LANDSCAPING: William J. Stephani, Jr.

PAINTING AND PAPERHANGING: Edward B. Ashbridge.

PLASTERING: Delaware County Plasterers.

PLUMBING AND HEATING: William T. Fowden.

ROADWORK: W. Ellis Johnson.

ROOFING: Warren-Ehret Company

STONEWORK: J. V. Catania.

AIR CONDITIONING: by General Electric Company.

CARPETS: Crestwood, by Alexander Smith and Sons Carpet Company.

CHAIRS: Bodiform, by American Seating Company.

CHANGEOVERS: Weaver, by Weaver Manufacturing Company.

COIN CHANGER: Lightning, by Johnson Fare Box Company.

CURTAIN CONTROLS AND TRACK: Vallen, by Vallen, Inc.

DISPLAY FRAMES: Custom-made.

DRAPERIES AND STAGE CURTAINS: through Paramount Decorating Company.

FILM CABINETS: Neumade, by Neumade Products Corporation.

LENSES: Cinephor, f/2.0, by Bausch and Lomb Company.

GENERATORS: Transverter, by Hertner Electric Optical Company.

LIGHTING FIXTURES: by Voigt Company, installed by Ford and Morris.

PROJECTION LAMPS: Peerless Magnarc, by J. E. McAuley Manufacturing Company.

PROJECTION MACHINES: Simplex E-7, by International Projector Corporation.

REWINDERS: Simplex, by International Projector Corporation.

SCREEN: Walker PM, by Walker American Corporation.

SOUND: Simplex Four Star, dual channel, by International Projector Corporation; with Voice of the Theatre speakers, by Altec Lansing Corporation.

SUPPLY DEALER: National Theatre Supply Division of National-Simplex-Bludworth, Inc.

TICKET-ISSUING MACHINE: Automaicket, by General Register Corporation.

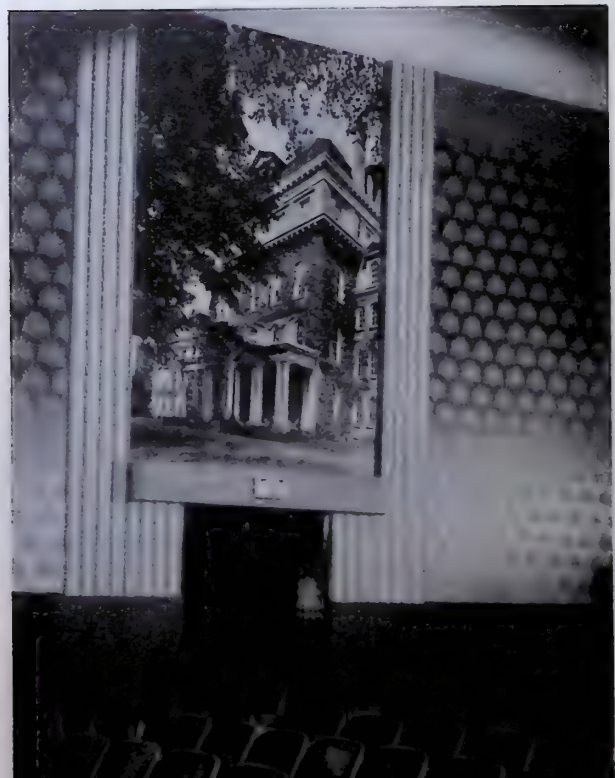
TICKET CHOPPER: by Newman Brothers.

VENDING MACHINES: through Berlo Vending Company.

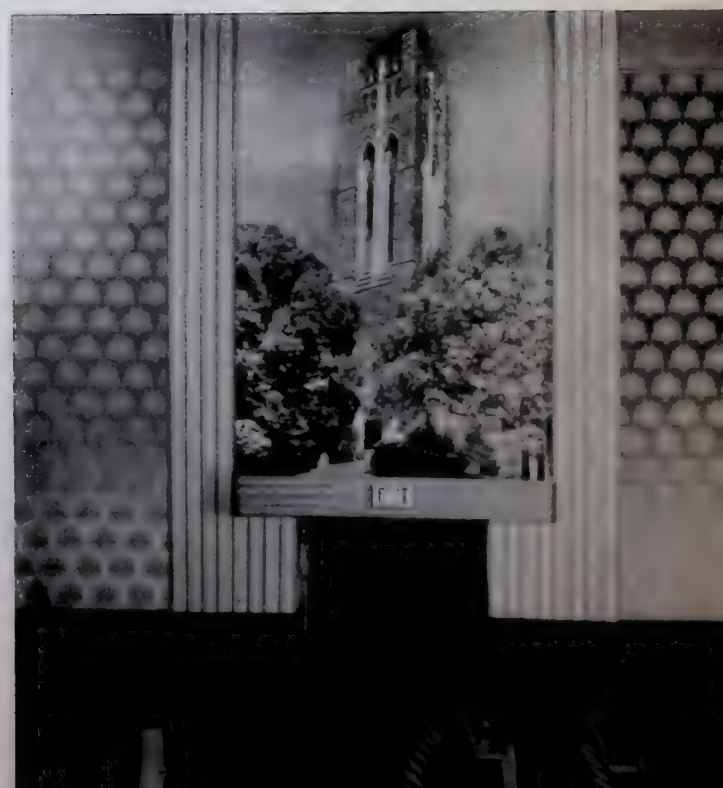
WALL FABRICS: by Frankel Associates, installed by Paramount Decorating Company.

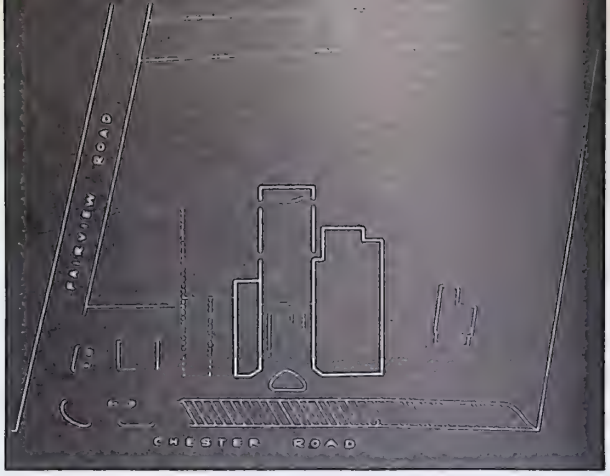
THE AUDITORIUM of the College Theatre has walls of a plaster base, with the lower portions painted a tomato red, with a blue-figured brocade on the upper portion to enhance the acoustics. The ceiling is of sand finish plaster. The placement of the photo-murals over the emergency exit doors, midway down the auditorium, tends to remove any feeling that the auditorium might have too much depth. The "frame" of the murals further set off these sole decorative features. The proscenium is in keeping with the comparative simplicity of the rest of the theatre. The side niches are very effectively lighted from the base.

PARRISH HALL, the main building of Swarthmore College, is the subject of the photomural on the auditorium's right wall. The original photograph was taken by G. Harry Hladky. As mounted, the mural is 9½ feet wide by 16½ feet high, with the six sections prepared from enlargements. The murals are bottom lighted.

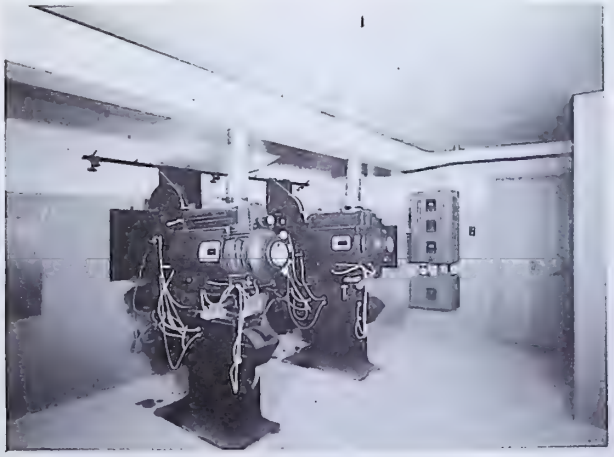


THE CLOTHIER MEMORIAL TOWER, another of Swarthmore College's notable structures, is the subject of the mural on the left auditorium wall. This is also from a Hladky original, blown to the same size as the other. The murals, the sole decorative attraction of the auditorium, are also set off by the blue wall fabric.



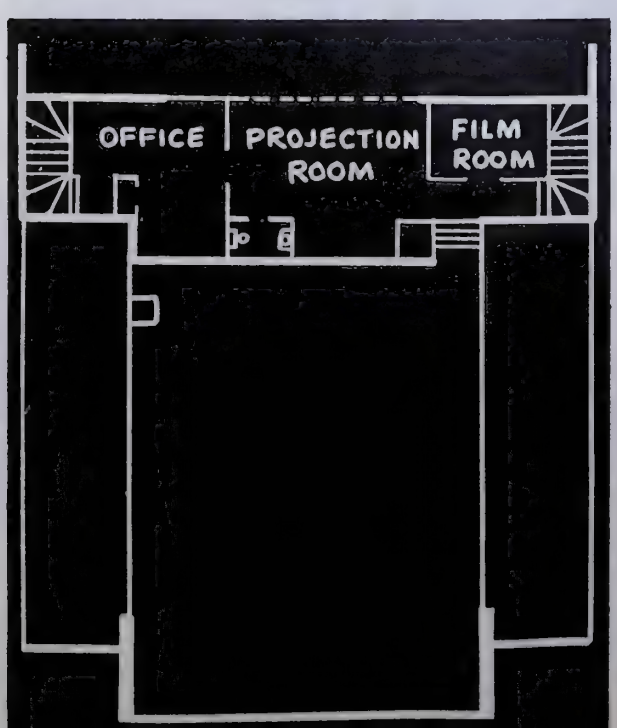


THE PLOT PLAN sketches the rest of what will eventually be a $250,000 investment. The heavy lines indicate the structures already completed, and the dotted lines the projected building. The small building at the right is presently a residence, later to be converted into a tea room. Even the gas station provides for growth.



THE PROJECTION ROOM of the College Theatre is modernly equipped and sufficiently spacious for the efficient operation of the various items of equipment. A spotlight port is provided for the time when this equipment becomes desirable. It might be that the future could see projection television installed at this point.

THE FLOOR PLANS—auditorium level at the left, second floor in the drawing below—show the efficient layout of the College theatre. For unstated reasons, the toilets in the finished theatre are the reverse from the positions indicated in the plans. Note how, through the lateral passages, strictly one-way patron flow is effected.



Backlighted Wall Plaques the Decorative Feature of a Post-War Theatre Auditorium in Philadelphia

THE DEVON THEATRE

The residents of Philadelphia's Mayfair district have been given a new theatre by Melvin Fox, in association with Jacob Fox and Louis Sablosky. Constructed of steel, brick, and concrete, the theatre is architecturally fire-proof, conforming to local regulations for this type of service.

The theatre front, below the marquee, is faced with tan structural glass. The upper portion of the facade is faced with buff brick, with a cast stone coping. The doors and frames, as well as the trim, is of stainless steel. The continuous soffit is of opal glass. The stainless steel frame of the marquee is backed with cold-cathode lighting to set off the silhouette letters.

The main ceiling of the auditorium contains three plaster domes. The walls are finished in acoustic plaster, acoustic tile, and fabric. The plaster is painted a gray-blue as also is the tile. The fabric portions are in magenta. Distinguishing feature of the decorative scheme is the single plaster plaque on each of the side walls. The plaque is 16 feet wide and 12 feet high, with the salient symbols of the motion-picture industry and the theatre in general woven into the design. Further effect is added by back-lighting the plaque.

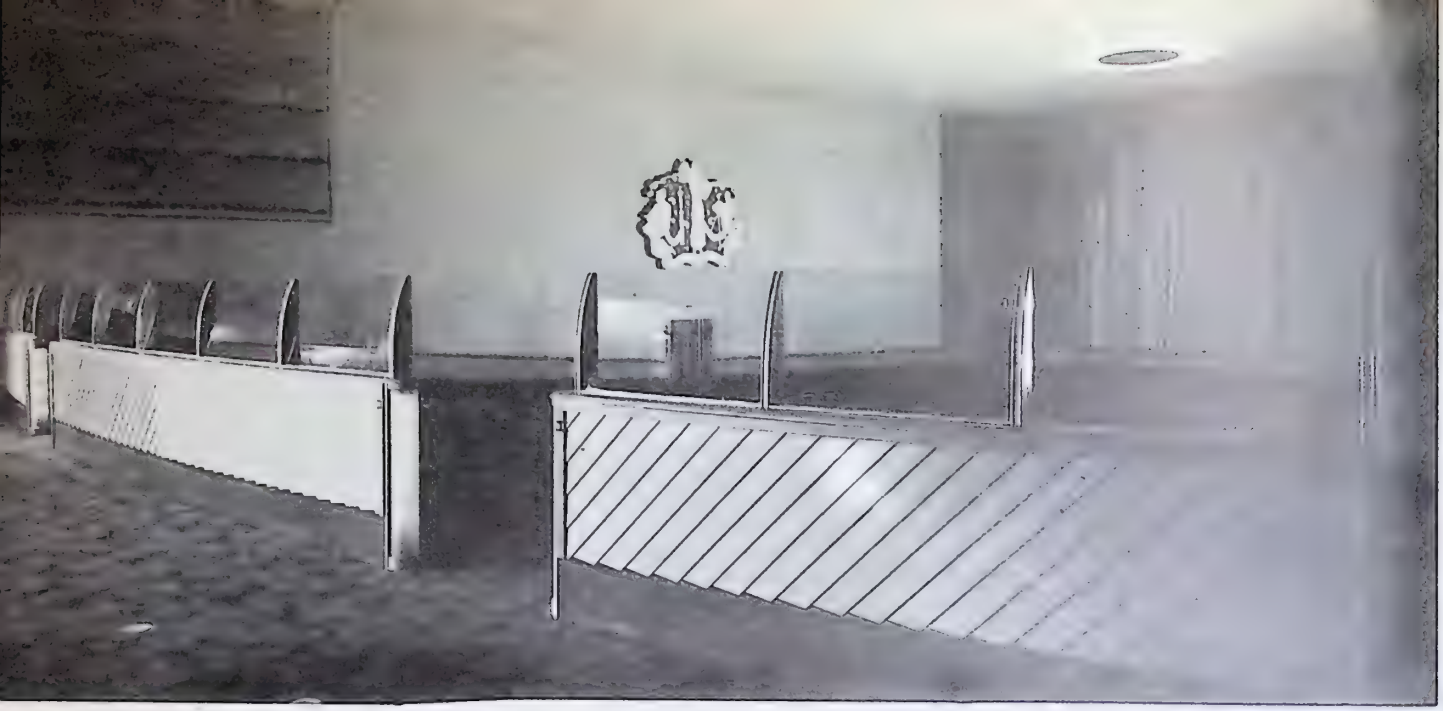
In the lobby and foyer are three 3-foot domes, equipped with glass lighting fixtures. The walls are of paneled birch, with glass-faced display frames also of birch.

Another mural adorns the rear wall of the lounge, but this one is painted. On the lounge side walls, part of the walls of the rest rooms are set with corrugated glass. The entire area is fully carpeted.

The theatre is equipped with all the latest items, designed to give the patrons the best in comfort and everything with which to enjoy the attractions of Hollywood producers from the standpoint of sound as well as sight.

As the theatre opened for service to the middle-income-group patronage, the operational policy was four changes a week, with a top admission price of 32 cents, plus taxes.

THE DEVON THEATRE is faced with buff brick, with a cast stone coping. Around the entrance to the theatre proper, the facing material is tan structural glass. The doors and frames, as well as the trim, is of stainless steel. The continuous soffit is of opal glass with stainless steel trim. Lighting is of the cold-cathode type, and is the source of marquee illumination. The lobby and foyer have plaster ceilings, with three domes, each 3 feet in diameter, equipped with lighting fixtures. The walls are birch-paneled, with glass-fronted birch display frames. The floor of the spacious lobby—the standing-room area—is fully carpeted as an acoustic measure.

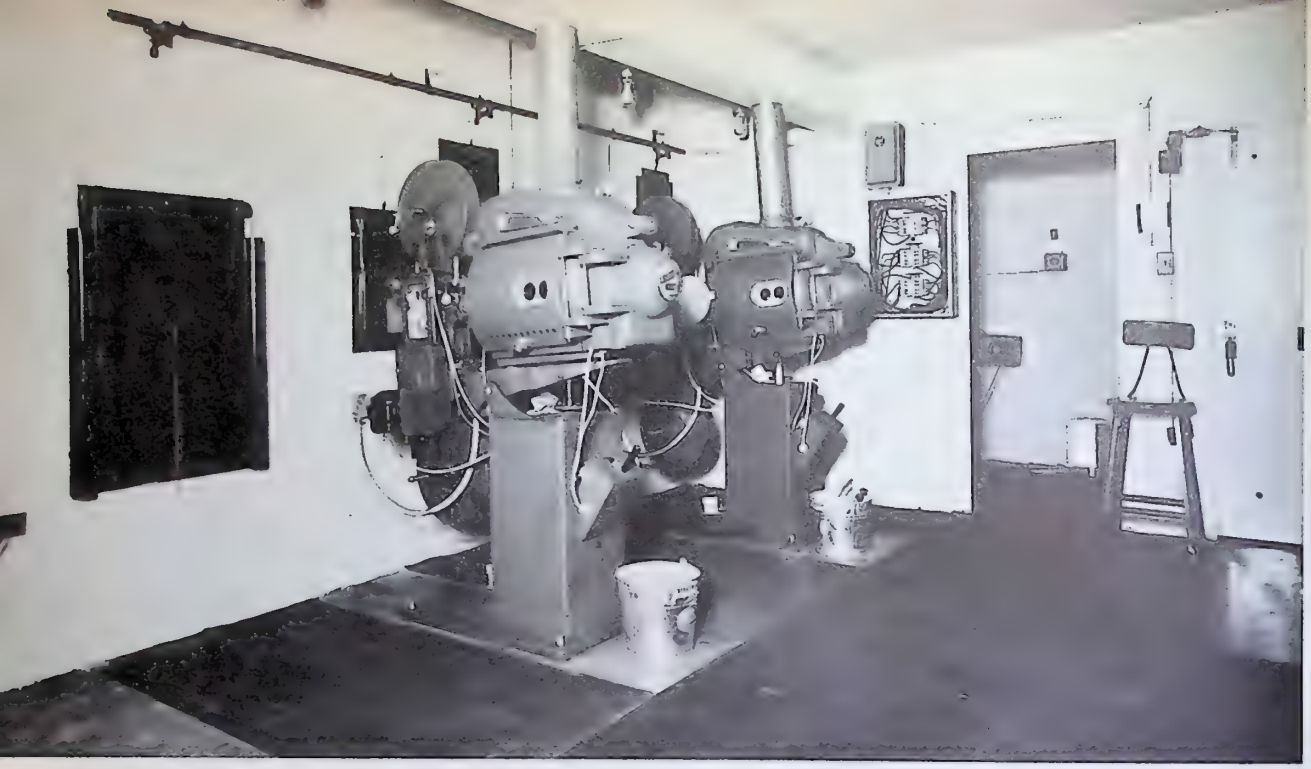


FROM THE STANDEE SPACE (above) a better idea is obtained of the placement of the fabric in the decorative scheme of the Devon Theatre. On the upper part of the side walls at the rear of the auditorium and at the proscenium end of the theatre can be seen the magenta fabric. Also can be obtained an idea of the placement of the auditorium left plaque, which measures 16 feet wide by 12 feet high, and its position of importance as the auditorium's outstanding mural decoration. The plaque is backlighted for further artistic effect. Glass panels surmounting the standee rail protects the seated audience from possible drafts that may be caused by incoming patrons.

THE MURAL PLAQUE (left) is shown in greater detail in this picture. In composing this work, the artist has blended all the traditional emblems of the stage with stylized symbols of the motion-picture industry. Here are seen the masks of the Muses, the harp of music, a camera, an Academy Oscar, and film. In the rear of the standee space is a painted mural (right), set above a seat upholstered in blue and white leather. Here again the theatre theme has been carried out by the artist. Another feature of this lounge area is the side walls of corrugated glass. The use of decorative plaques to adorn otherwise plain walls is not new, but the practice is enjoying new life.

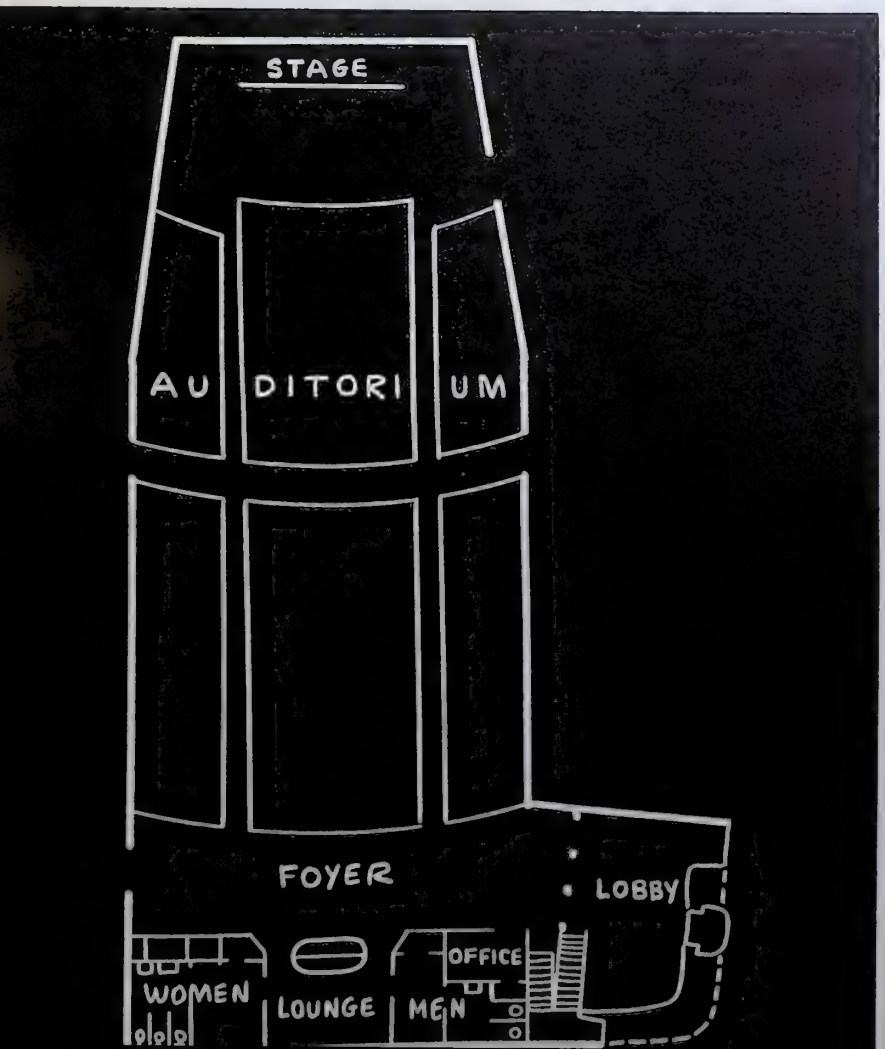
A FULL VIEW OF THE LOUNGE (below) better shows the placement of the painted mural described above, as well as one of the facing side walls fabricated from corrugated glass. This is the view of the area as the patron entered the foyer. As part of the theatre's permanent equipment is the padded-base, glass-topped candy counter, strategically placed to greet all patrons of the lounge area. Further on, however, is a portable candy machine and a smaller machine for vending three kinds of nuts. The men's facilities of the Devon are located across the lounge area from the ladies' and also has a corrugated glass wall. Referring to the lounge mural it is an auditorium decoration.

THE AUDITORIUM of the Devon Theatre has in the ceiling three plaster domes in which lighting fixtures are installed. The walls are of acoustical plaster and tile, and some fabric. The acoustical tiles are painted a blue-gray, as also is the acoustical plaster. The plaster is magenta. Each side wall is embellished with a 12 by 16-foot decorated plaster plaque, back-lighted for special effect. The ladies' room (not pictured) has dusty pink-colored tile up to the ceiling and the men's room (not pictured) has oatmeal-colored tile also to the ceiling. Floors are of ceramic tile, with special designs. The metal cubicles in both toilets are gray.



THE PROJECTION ROOM (above) is spacious and equipped with all the latest devices for the fine projection of both picture and sound. Note space is allowed for possible spotlights or other equipment.

FLOOR PLAN (below) shows the economic use of space on the theatre's 80 by 150-foot lot, with manager's office, lounge, men's and ladies' rooms off the foyer. The theatre has a seating capacity of 878.



REFERENCE CREDITS

THE DEVON THEATRE

Philadelphia, Pennsylvania

OWNER AND OPERATOR: Melvin Fox.

ARCHITECT: Thalheimer and Weitz.

DECORATOR: Joe Hornstein, Inc.

SEATING CAPACITY: 878 persons.

COST OF BUILDING (EXCLUSIVE OF EQUIPMENT): $225,000.

COST OF EUIPMENT (EXCLUSIVE OF AIR CONDITIONING): $25,000.

AIR CONDITIONING: by York Corporation.

CARPET: Wilton, Lee Red Pattern, by A. and M. Karagheusian.

CHAIRS: Ideal Chief Line, with self-rising cushsions, by Ideal Seating Company.

CHANGEOVERS: Strong Zipper, by Essannay Manufacturing Company.

CURTAIN CONTROLS AND TRACK: by Automatic Devices Company.

DRAPERIES AND STAGE CURTAINS: Fiberglas, through National Drapery Studio.

FILM CABINETS: Neumade, by Neumade Products Corporation.

GENERATORS: Imperial Stedypower, by J. E. Robin, Inc.

LENSES: Super Cinephor (Balcoted), by Bausch and Lomb Optical Company.

PROJECTION LAMPS: Suprex High Intensity, by C. S. Ashcraft Manufacturing Company.

PROJECTION MACHINES: Motiograph, Model K Deluxe, by Motiograph.

REWINDERS: Newmade, Neumade Products Corporation.

SCREEN: Raytone Mirrophonic, by Raytone Screen Company.

SIGN AND MARQUEE: by Apex Sign Company.

SOUND: Mirrophonic Deluxe, by Motiograph.

SUPPLY DEALER: Joe Hornstein, Inc.

TICKET-ISSUING MACHINE: Automaticket, by General Register Corporation.

VENDING MACHINE: through Berlo Vending Company.

WALL FABRICS: Fiberglas, by Owens-Corning Fiberglas Corporation.

A Theatre in Mount Clemens, Michigan, Is Built into the Nine-Story Monitor-Leader Building

THE EMSEE THEATRE

The Emsee Theatre, in Mount Clemens, Michigan, is actually an addition to the nine-story Monitor-Leader Building, originally designed by Weston and Ellington. In creating the theatre, Architect Talmadge C. Hughes utilized two existing walls to form the walls of the theatre and one of the stores for the lobby and foyer.

The theatre, simple-clean-cut, and modern, is constructed of cinder block, which has also been utilized in the decorative scheme.

The front is finished in cream-colored porcelain enamel, with accentuating trim in blue and red.

The marquee is finished in cream orange and red.

The lobby is done in brown and green pastel, with designs in gold and silver. The foyer extension is trimmed in Turkish red, with designs in green, gold, and silver. The foyer proper has a ceiling of light rose, balanced with gold and silver lines. The lower half of the cinder block walls are staggered block decoration in various shades of reddish brown.

As the theatre opened, the operational policy was second-run, with a top adult admission of 35 cents and a children's admission of 14 cents, with a program of regular releases "as they come."

THE STANDEE AREA (above), completely carpeted and equipped with modern furniture, has a ceiling of light rose. Walls are of balanced cinderblock, with gold and silver lines. The lower half of the walls are of staggered block decoration, in various shades of reddish brown. The foyer extension is in Turkish red, with designs in green, gold, and silver. The toilet rooms have been finished in tile in a cream tone, with terrazzo floors. Note that a studio-type glass panel protects the auditorium from possible lobby draughts.

THE LOBBY (left) is done in pastel shades of brown and green and designs in gold and silver. The box office is built in this area, rather than outside the main entrance doors. The foyer extension is done in Turkish red, with designs in green, gold, and silver. The foyer proper has a ceiling light rose in color, balanced with gold and silver lines. The lobby and foyer have been constructed in what used to be a store, with the rest of the theatre an addition to the present nine-story building of the Monitor and Leader.

THE CANDY COUNTER and the associated popcorn machine (below) is specially designed for installation at the Emsee Theatre. Located in the foyer, it is situated so that it offers the passing an invitation to buy even though the idea was not especially in mind when the ticket was purchased. The display of bar goods is ample to entice the purchaser, and it is possible to have a liberal display on top of the counter when the theatre is operating. A single attendant can handle the sales of both candy and popcorn.

REFERENCE CREDITS

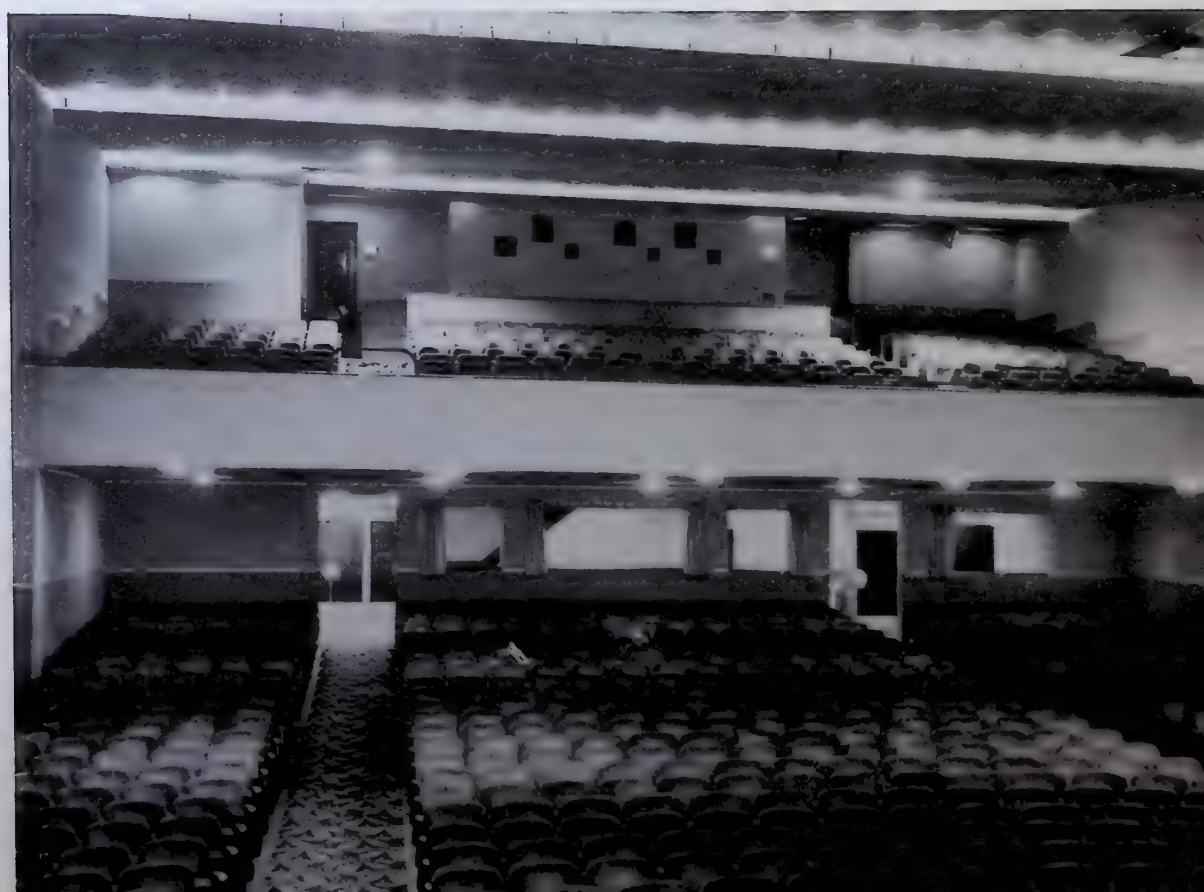
THE EMSEE THEATRE

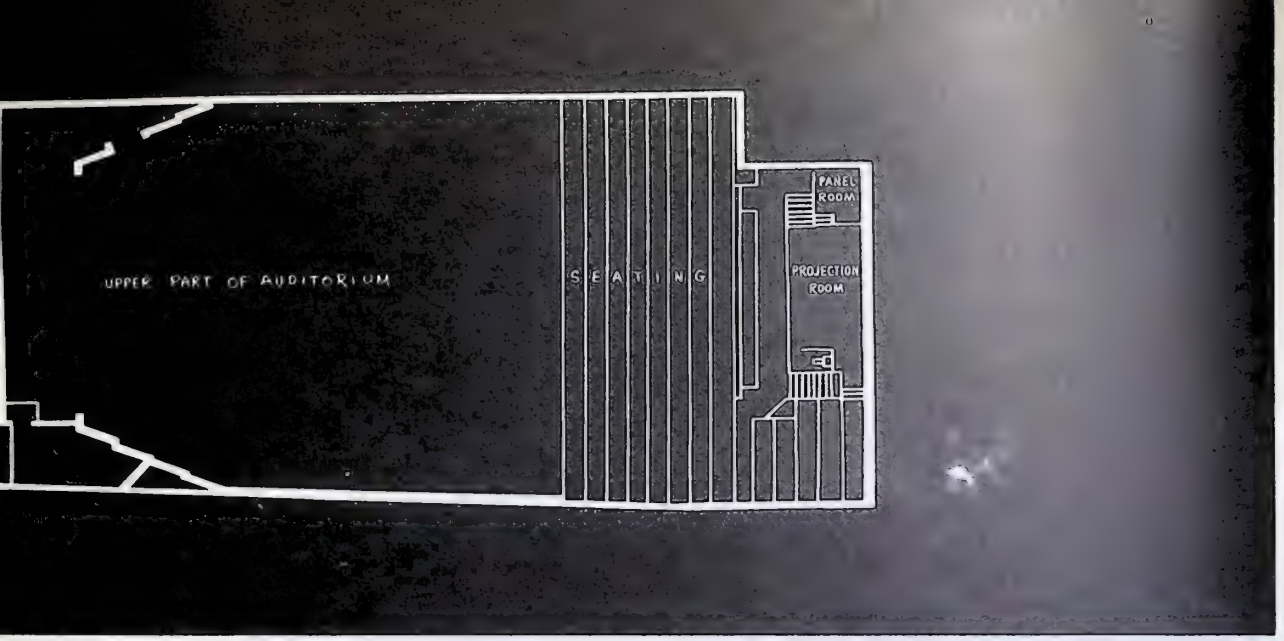
Mount Clemens, Michigan

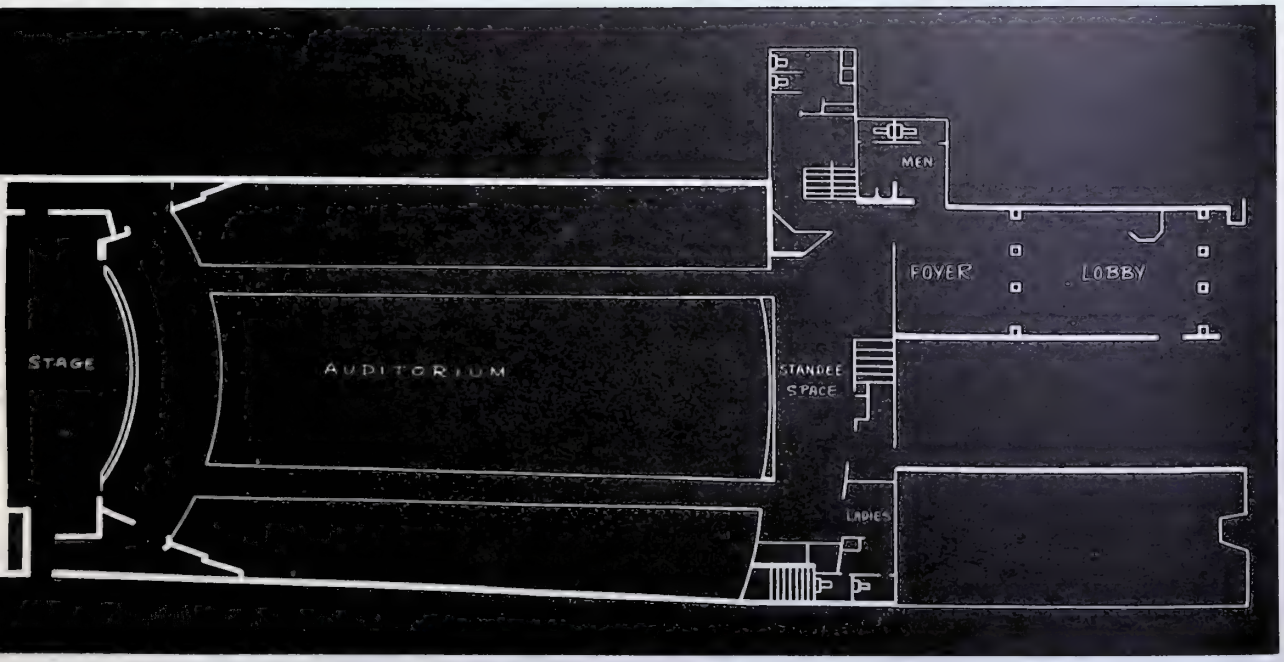
OWNER AND OPERATOR: R. Roy Shook.
ARCHITECT: Talmadge C. Hughes.
DECORATOR: Jagmin Studio.
SEATING CAPACITY: 1,063 persons.
COST OF BUILDING (EXCLUSIVE OF EQUIPMENT): $75,000.
COST OF EQUIPMENT (INCLUDING AIR CONDITIONING): $42,000.

AIR CONDITIONING: 30-ton Governair, by Governair Corporation.
CARPETS: Crestwood, by Alexander Smith and Sons Carpet Company.
CHAIRS: by American Seating Company.
PROJECTION LAMPS: Peerless, by J. E. McAuley Manufacturing Company.
PROJECTION MACHINES: Simplex, by International Projector Corporation.
SIGN AND MARQUEE: by Long Sign Company.
SIGN LETTERS: Wagner, by Wagner Sign Service, Inc.
SOUND: Simplex Four Star, by International Projector Corporation.
SUPPLY DEALER: National Theatre Supply Division of National-Simplex-Bludworth, Inc.

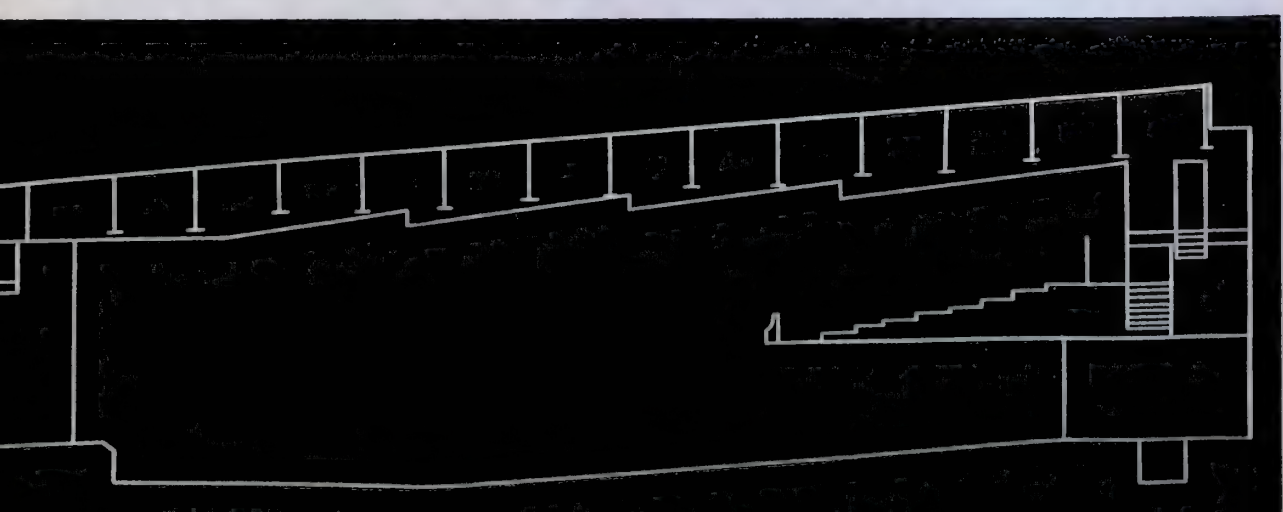
THE AUDITORIUM of the Emsee Theatre is one of simple elegance, where the maximum advantages are taken of decorative possibilities of properly colored acoustical plaster and Celotex. Whether viewed toward the screen (top photograph) or toward the rear (lower photograph), the auditorium is quiet and pleasant, with nothing that can detract, however, inadvertantly, the attention from the s fare. Note the ostensible triplicate projection booth setup, although the p does not indicate whether or not there are three projectors. Note also the p ment of auditorium lighting on the screen side of the various "steps" in the ce







THE PLANS of the Emsee Theatre shown in the top two drawings show in part how the cinema has been added to the Monitor-Leader Building, utilizing the space of one store for the lobby and foyer. The drawing at the bottom of the page suggests the manner of suspending the theatre ceiling and how the wall-bearing trusses, 8 feet on center, provide the catwalk. The compressor room is located over the stage right exit area. The main floor is designed to seat 787, with 276 in the balcony. A standee space, estimated to accommodate 47, brings the total possible number of patrons at any one time to 1,110, of which 1,063 can be seated.



In The Bronx, New York, a Post-War Theatre Rises at Pelham Parkway and White Plains Road

THE GLOBE THEATRE

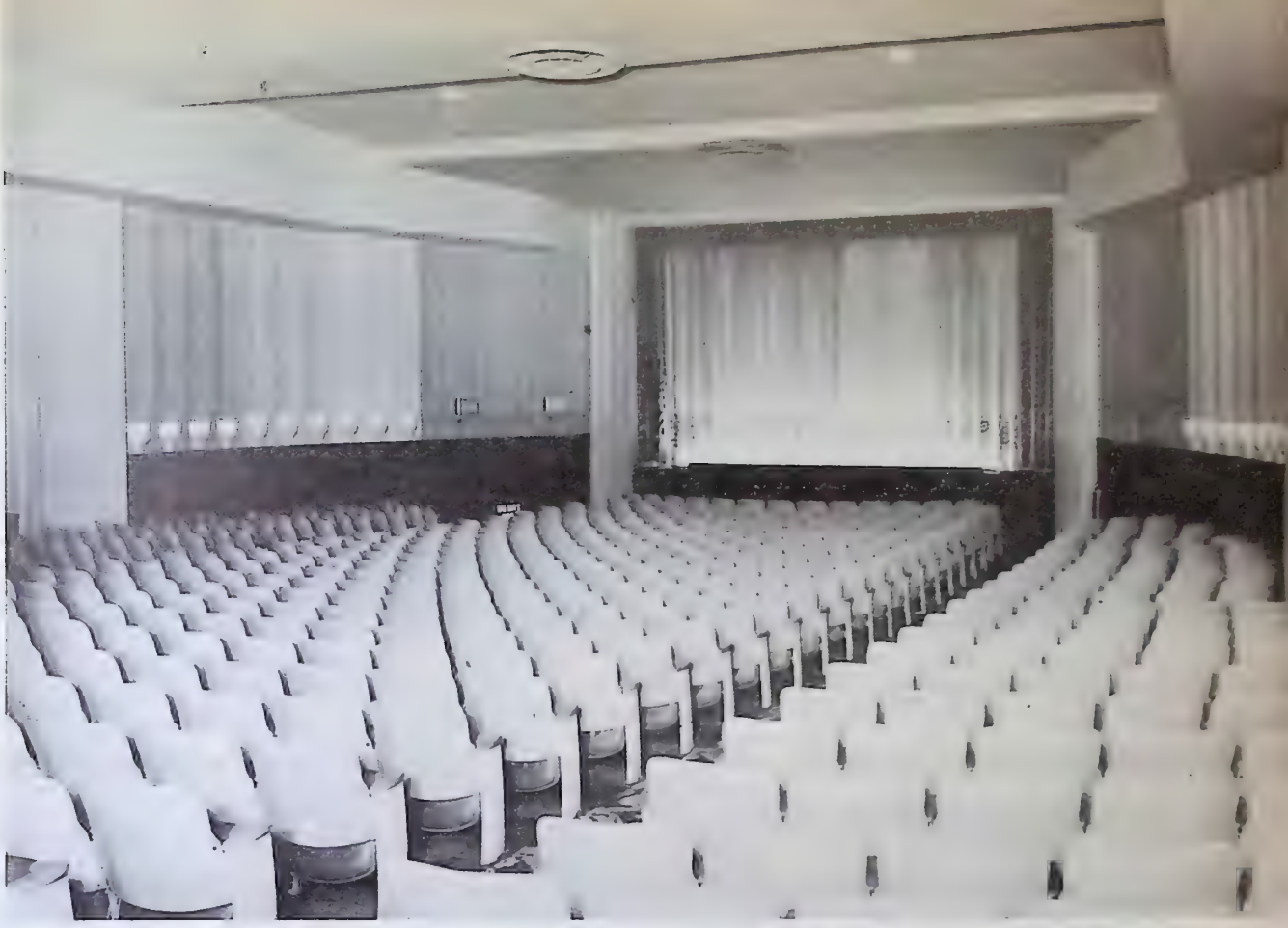
Centered in an area with a drawing power estimated at 30,000, the Globe Theatre became the first of the post-war cinemas to open in New York's Borough of The Bronx. Typical of the subsequent-run theatres in thickly populated areas, the facade of the Globe has been restricted to mostly an entrance surmounted by a large marquee, with only a suggestion further above of the architect's ideas in neo-classic design. Although the house seats but 600, a spacious standee promenade provides space for additional customers, while yet more entertainment-seekers, at peak times, can be accommodated in the ingress half of the lobby, which has been made deep to permit the placing of the auditorium proper wholly at the rear of the adjacent stores. As the theatre opened, a grind policy, from noon to midnight, was established.

THE FRONT OF THE GLOBE THEATRE reveals an economy of space, with the side box office eliminating the possibility of patron congestion in either direction at the outermost doors. With virtually the entire theatre front entrance area, and with the poster and advertising space at the irreducible minimum, a large marquee, with generous spaces for letters became mandatory, so that the current attractions might be adequately set forth. Except for the dark Italian marble forming the base for the walnut display frames, tones of buff predominate, with a similar tone in the neo-classic brick portion of the upper facade. Recessed rubber mats are used at doors.

THE LOBBY OF THE GLOBE THEATRE (above) is long, designed to run back the whole length of the stores that are, or will be, on either side of it. Although the posts for the standee ropes are positioned to hold the crowd on the entering third of the area, temporary posts might be used so that two thirds of the space might be for the hold-outs. In this case, it is quite probable that the ticket box would be moved to the outer doors and extra ushers stationed at the doorman's usual position. The dado is of polished Italian marble, with the walls above covered with gold-colored cloth. The display frames are of walnut and are recessed for effective side lighting.

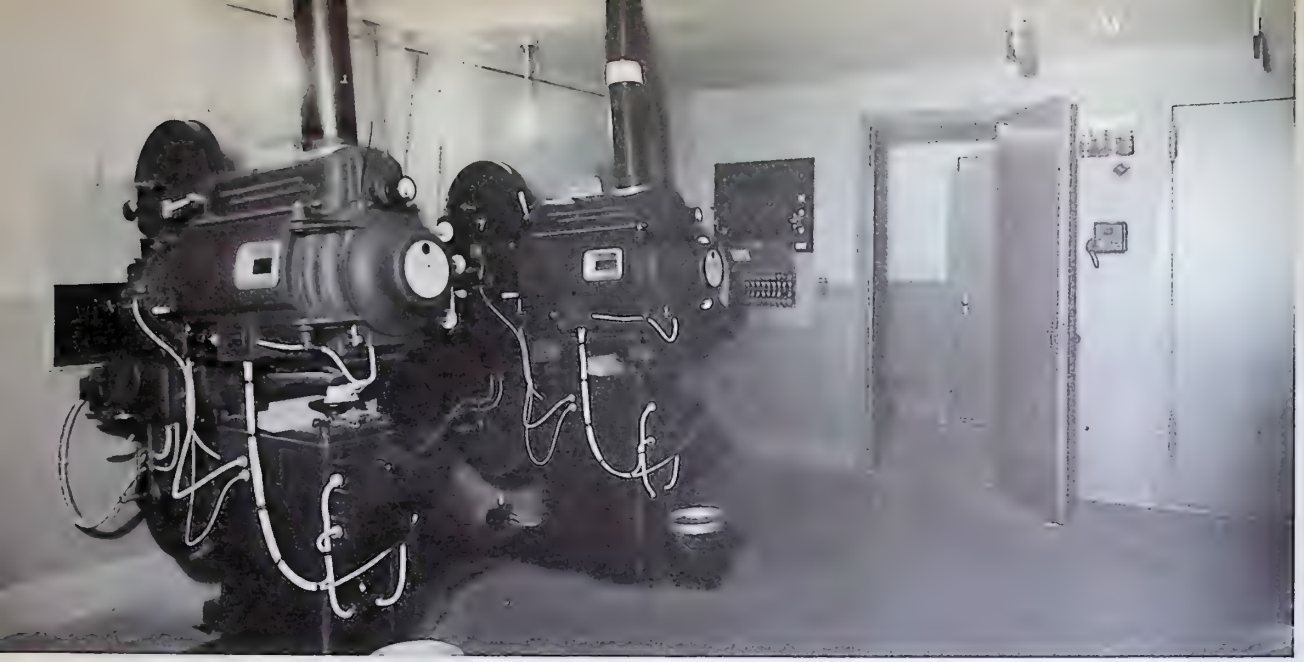
THE LOUNGE (left) is located on the basement level of the theatre, entered from a short stairway from the rear of the auditorium. The decorative tie-in, as in many theatres, is the carpet, a Persian-type manufacture done in maroon with a stylized pattern in light green. The wall covering is paper, with a floral design in red and gold. Recessed gold-toned lighting, in a pink ceiling completes the decoration of the lounge. Comfortable club chairs, with handy sand urns, are provided for those who wish to smoke. Note especially the strategically placed fire extinguisher, easily reached and ready for action in any part of the lounge and adjacent rooms.

OPPOSITE THE STAIRS (below) in the lounge are located the toilets and other private rooms of the management. In the ladies' powder room have been installed mirrors, soft chairs, and an end table. The toilet area is finished in peach-colored tile. The men's room is similarly appointed, although in a more masculine mood. Toilet tiling is black. It should be observed that here no pictures are used, the only thing of this type being a convenient mirror. It may be entirely coincidental that the previous picture was taken from such a point that the fire extinguisher is seen in reflection, which is, of course, good propaganda on the part of the management and architect.



THE AUDITORIUM OF THE GLOBE THEATRE, looking toward the screen, shows the first of two types of decoration, here the walls seem to be paneled in various shades of light colors, with a thin silver stripe separating them. The lighting, both in the ceiling and walls, is of the indirect type, better seen in the next picture.

THE REAR PORTION of the auditorium reveals the second type of decoration, a dark fabric. Here can also be seen how the incandescent bulbs (in two color circuits) have been set in coves not too well hiaden from the view of the departing patron. The aisles are carpeted with the same design used in other parts of the house.



THE PROJECTION ROOM, on the second floor, is spacious, with plenty of working space between the projectors, as well as ample room for manipulating the lighting controls for the auditorium and for replacing any fuses which might blow. The projection and observation ports are properly shuttered, with the closures held open by chains into which have been inserted fusible links. For the convenience of the projectionist, and as a precautionary measure against accidental fire, a sand pail has been provided each projector. Note, too, that the incandescent bulbs for general illumination are enclosed in an approved type of protective shield.

REFERENCE CREDITS

THE GLOBE THEATRE

New York (The Bronx), New York

OWNER: Rayglo Theatre Corporation.

OPERATOR: Raybond Amusement Corporation.

ARCHITECT: William I. Hohauser.

DECORATOR: Rau Studios, Inc.

SEATING CAPACITY: 600.

COST OF BUILDING, EXCLUSIVE OF EQUIPMENT: $90,000.

COST OF EQUIPMENT: $30,000.

CHAIRS: Ideal, by the Ideal Seating Company.

CHANGEOVERS: Thide, by the Dowser Manufacturing Company.

COIN CHANGER: Johnson Lightning Changer, by the Johnson Fare Box Company.

CURTAIN CONTROLS AND TRACK: by Vallen, Inc.

DRAPERIES AND STAGE CURTAINS: through Regal Drapery Company.

FILM CABINETS: Neumade, by Neumade Products Corporation.

GENERATORS: Transverters, by the Hertner Electric Company.

LENSES: Super Cinephor, f/2.0 (Balcoated), by Bausch and Lomb Optical Company.

LIGHTING FIXTURES: through the Boro Electric Company.

PROJECTION LAMPS: Peerless Magnarc, by the J. E. McAuley, Manufacturing Company.

PROJECTION MACHINES: Super Simplex, by the International Projector Corporation.

REWINDERS: Golde Automatic, by the Golde Manufacturing Company.

SCREEN: Walker White, by the Walker American Corporation.

SIGN AND MARQUEE: by the Continental Sign Company.

SIGN LETTERS: Bevelite, by Theatre Specialties, Inc.

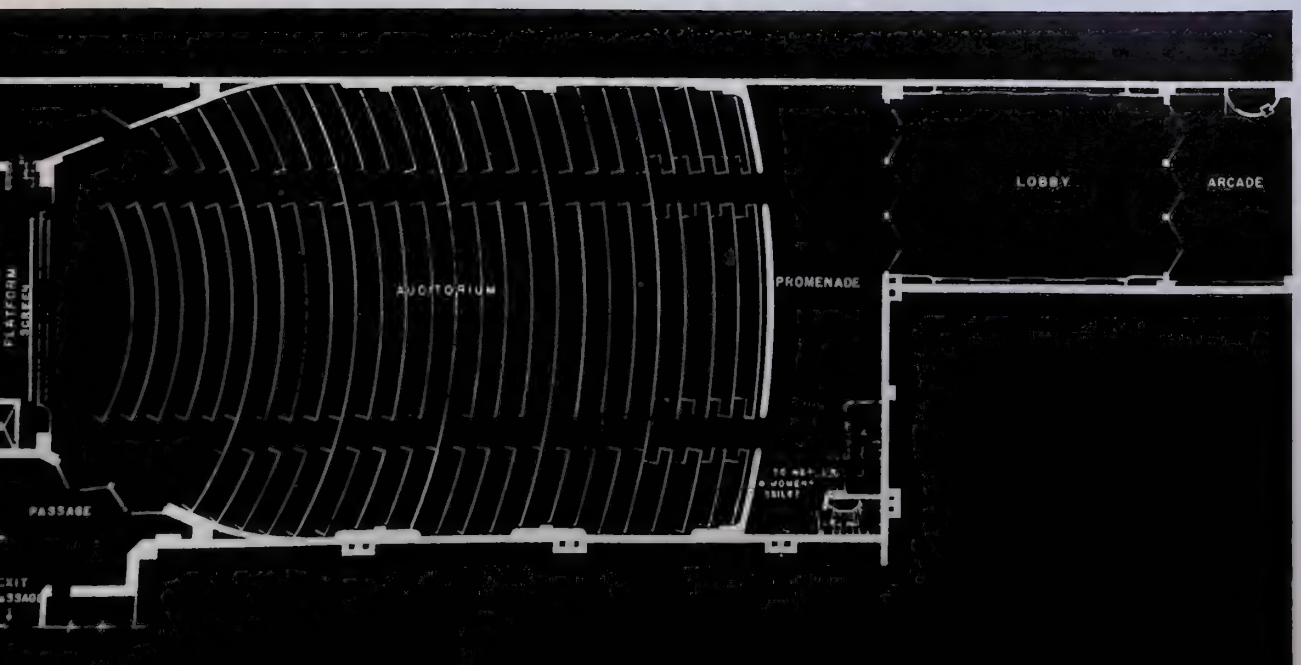
SOUND: Simplex Four Star, by the International Projector Corporation; with Voice of the Theatre speakers, by the Altec Lansing Corporation.

SUPPLY DEALER: National Theatre Supply Division of National-Simplex-Bludworth, Inc.

TICKET-ISSUING MACHINE: Automaticket, by the General Register Corporation.

VENDING MACHINES: Candy machine, through Sanitary Automatic Corporation.

THE PLAN OF THE AUDITORIUM shows the economy with which the Globe Theatre has been laid out. While about three more rows of seats could have been installed, it was deemed advisable to provide instead an ample promenade for the convenience of standees during periods of peak business. The equally ample lobby also affords space for anxious, entertainment-seeking patrons. The second floor holds the projection booth and a few other essential rooms. Lounge and restrooms are on the basement level, reached by stairs 'way around to the left as one enters from the lobby. Since only pictures are to be used, the stage area is practically vestigial.



Named for the First Hero, Blatt Brothers Dedicate Latest Cinema to Greenville's 42 War Dead

THE JORDAN THEATRE

Thoroughly modern in arrangement, construction, and appointment, the new Jordan Theatre in Greenville, Pennsylvania, provides one of the most complete and comfortable houses in the northwestern part of the Commonwealth.

The theatre is the eighteenth in the circuit operated by the Blatt Brothers—Charles R. and the twins, William J. and John A.—in Greenville, Corry, Somerset, Patton, Mercer, New Bethlehem, Youngswood, Roaring Spring, Girard, Albion, Port Allegheny, Youngsville, Smethport, Berlin, East Brady, and Martinsburg.

This new "flagship of the fleet" was named in honor of Cpl. James O. Jordan, the first Greenville casualty in World War II, and has been dedicated to the 42 from that community who died in that conflict.

The theatre building, of brick, concrete, steel, and tile construction, extends 120 feet along North Mercer Street and a like footage along Shenango Street. The outside walls have base courses of brown brick topped with courses tan and cream brick in horizontal stripes. Sun tan Carara glass is used on the outside walls around the ticket booth on the corner, as well as over and beween the main entrance doors.

Three double doors separate the foyer from the sloping lobby, roughened to prevent slipping. Off the foyer is a 2½x6-foot telephone booth. In the foyer also is a glass-topped case for candy and chewing gum.

The auditorium possesses 4-foot aisles, covered with twist-weave carpet, heavily padded. To a level, varying with the slope of the floor, the side walls are finished in a rich cream, with the upper portions of the walls covered with widths of fire-proof fabric applied horizontally. The cross aisle is 5 feet wide. There are five double-door emergency exits.

In addition to the complement of regular theatre chairs, 26 so-called love seats have been added at tier ends throughout the auditorium. All the chairs are of red metal backs, with ribbed coral plush backfronts and similar wide welts. The cushions are fully upholstered with semi-pillow, deep-spring edges of brown Naughahyde. End standards are of amethyst red, highlighted in gold.

The stage, with an inside width of 82 feet, is equipped with a 52-foot, circular, fire-proof curtain of antique gold, ribbed with plush. In front of the screen the traveler is of golden beige. The pilasters at the side of the stage are finished in Chinese red and conceal the lighting.

On the second floor are located the projection room, with its associated generator and rewind rooms, and emergency lighting plant.

Heat is provided by a 15-section boiler, while the air-conditioning system takes advantage of a 200-foot deep well.

The theatre was designed by Victor A. Rigaumont; C. E. Picard decorated the theatre, from marquee to stage; and George Hoppel was the general contractor.

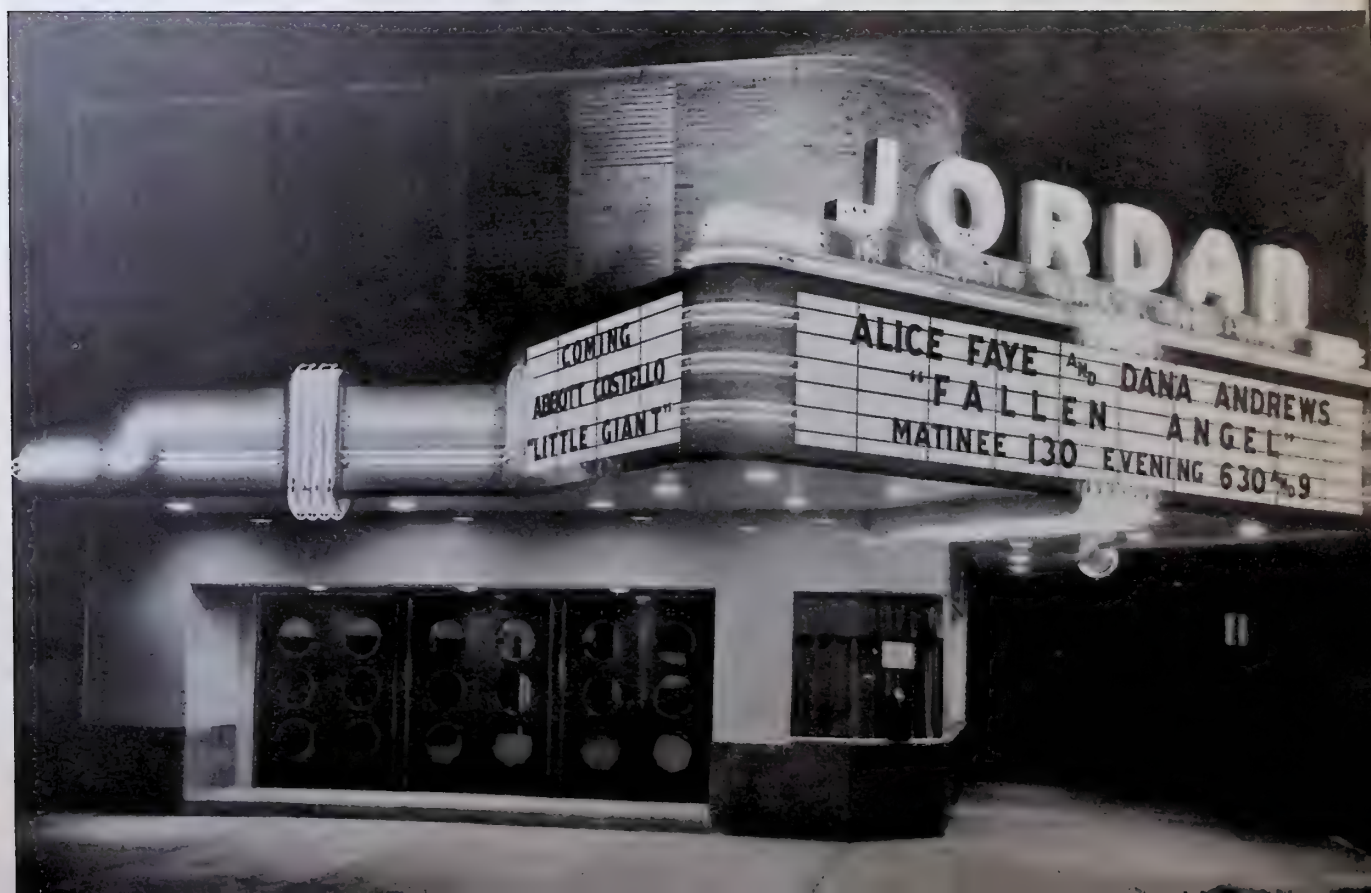
THE BIG MARQUEE, with a circumference of 85 feet, utilizes the recently-developed cold-cathode tubing to outline it and to illuminate the announcement panels. The tubing is said to replace 1,000 bulbs. There are 33 tubes behind the large center part, with 13 behind the side panels. Fourteen glass reflector lights, set flush in the soffit, flood the area beneath with light. The 5x24-foot display on the Shenango Street side is also cold-cathode lighted. Sun tan Carrara glass is used around the box office, as well as over and between the three pairs of flush, hard-wood entrance doors along North Mercer Street. Circular door panels are of blue glass.

AT EITHER SIDE OF THE LOUNGE, running the full width of the lobby, antique, gold-corded, plush drapes, similar to the traveler curtain on the stage, are tied back from their full drop from the ceiling. Two metal torchiers diffuse soft light on the light blue and rose-tan back and side walls of these sumptuous alcoves.

THE STANDEE RAIL is built of glass blocks through which glows cathode-tube lighting in diffused colors. The rounded top of the rail is heavily padded and upholstered. Flush ceiling lights illuminate the aisle heads. The Braewood Wilton carpet is of two-tone henna with an over-all design of leaves and stars in gold.

AUDITORIUM OF THE JORDAN THEATRE seats 1,200 on a single floor. The walls are covered with rose-red plush and French blue damask. The ceiling is of Aqua blue, with decorative bands of coral rose and golden beige. A feature of the seating is the 26 love seats, whose extra width assist in staggering the seats.

COMMANDING IMMEDIATE ATTENTION at all times, and especially at night, the huge marquee at the corner of the building can be seen in all four directions. Surmounting the marquee is the theatre name in separate lighted letters. (All plans and designs of this theatre, copyrighted 1944, by Victor A. Rigaumont, architect.)



REFERENCE CREDITS

THE JORDAN THEATRE

Greenville, Pennsylvania

OWNER: Blatt Brothers.

OPERATOR: Blatt Brothers.

ARCHITECT: Victor A. Rigaumont.

DECORATOR: C. E. Picard.

GENERAL CONTRACTOR: George Hoppel.

SIZE OF LOT: 120 by 120 feet.

SEATING CAPACITY: 1,200 persons.

COST, EXCLUDING EQUIPMENT: $100,000.

AIR CONDITIONING: Deep-well pump, by Cook; cooling coils, by the Trane Company; fans, by ILG Electric Ventilating Company.

CARPETS: Braewood Wilton, by the Mohawk Carpet Mills, Inc.

CHAIRS: Air-Loc Kumfort Zone, by National Manufacturing Company.

COINCHANGER: by Brandt Automatic Cashier Company.

CURTAIN CONTROLS AND TRACK: by Vallen, Inc.

DISPLAY FRAMES: by National Screen Service Corporation.

EMERGENCY LIGHTING PLANT: Kohler, by National Emergency Light Company.

FILM CABINETS: by Neumade Products Corporation.

GENERATORS: Hi-70-140, by Hertner Electric Company.

LENSES: Super Cinephor (Balcote-surfaced), by Bausch and Lomb Optical Company.

PROJECTION LAMPS: Peerless Magnarc, by J. E. McAuley Manufacturing Company.

PROJECTION MACHINES: Super Simplex, by International Projector Corporation.

REWINDERS: by GoldE Manufacturing Company.

SCREEN: RCA Snowhite, by the Radio Corporation of America.

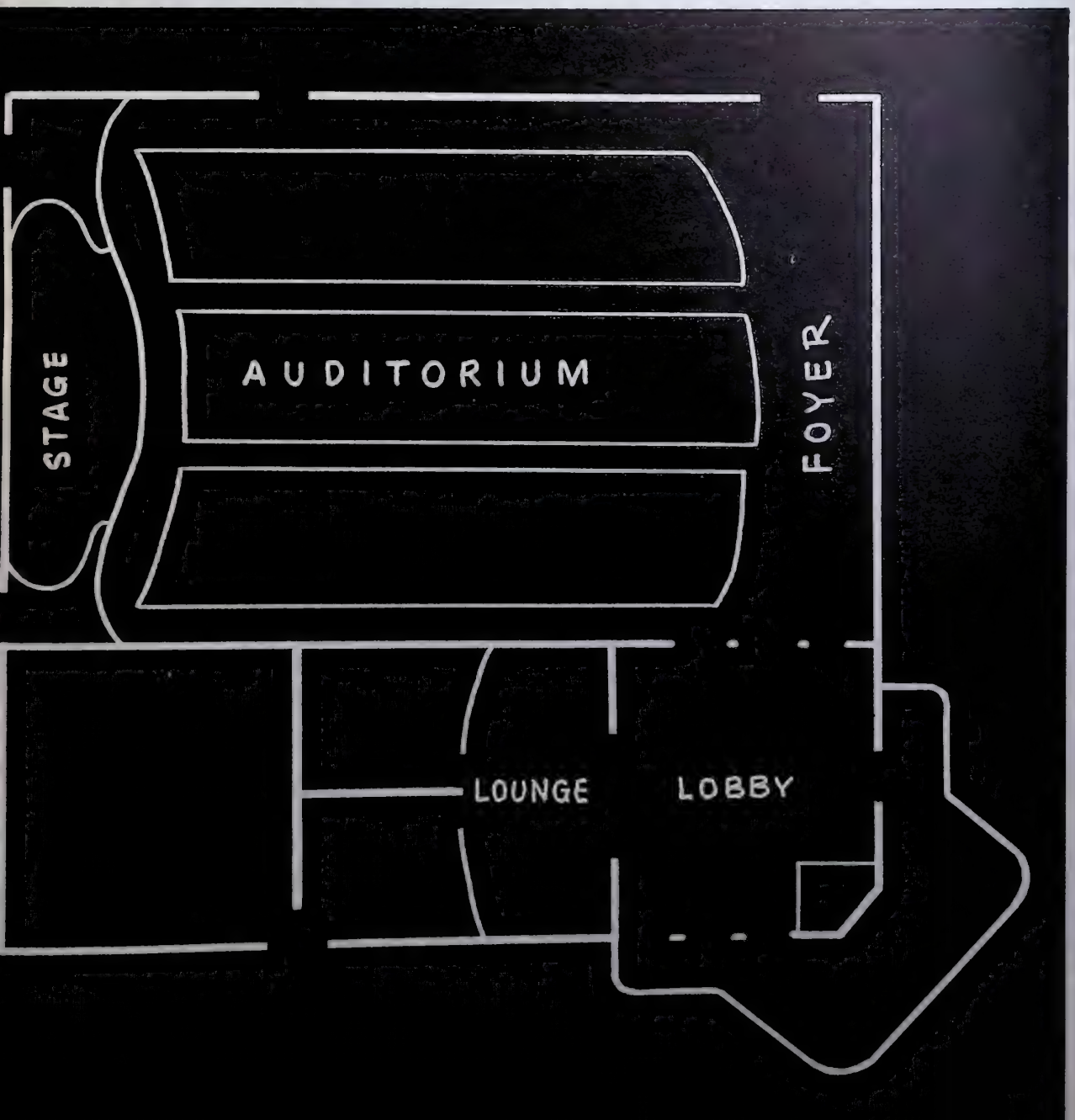
SIGN AND MARQUEE: by Kreiss Sign Company.

SIGN LETTERS: Third-Dimension, with Remova-Panel frames, by Adler Silhouette Sign Letter Company.

SOUND: Simplex, Type A-30, by International Projector Corporation.

SUPPLY DEALER: National Theatre Supply.

LOCATED IN THE MAIN BUSINESS SECTION of Greenville, although half a block from the main thoroughfare, the Jordan Theatre is admirably situated and excellently designed to meet the entertainment demands of the city's 8,000 and the 27,000 more within easy travel-and-shopping distance. The war and its attendant government restrictions on the use of critical materials enforced many changes in original plans, with the result that the theatre is not only marked in its simplicity of design, in the interior no less than on the exterior, but most efficiently planned, to take full advantage of every one of the 14,400 square feet of the lot.



In Franklin, Pennsylvania, a New and Better Cinema Rises from the Ruins of the Old Park Theatre

THE KAYTON THEATRE

"All new, even the name" well characterizes the Kayton Theatre, in Franklin, Pennsylvania, for this post-war cinema replaces the old Park Theatre that, on November 20, 1944, was so badly damaged by fire that only a completely new house could rectify the damage.

The Kayton was a year in the building. It was planned originally to have the showplace ready the fall following the fire, but delays in obtaining materials held up completion. While materials were difficult to obtain, the general contractor did the best, and a substantial job was accomplished from the bottom of the foundation to the roof. During the delay, also, came the decision to abandon the name, New Park Theatre, and to select one that would represent the owning-operating partnership. To that end the final syllables of the surnames of Leonard T. Houghton and Paul V. McKay were rearranged, and the Kayton Theatre had its name.

Entering from the street is the spacious approach to the box office, fully 20 feet inside the building line. The walls of this section are of green and cream Carrara glass. The remainder of the lobby is divided into two sections, with swinging doors between.

Paralleling half of the length of the lobby in the theatre building is a drug store, to which there are entrances from the theatre lobby. To the rear of the store are the offices of the Kayton Entertainment Company, ladies' powder rooms, and men's rest room.

The auditorium, 150 long by 60 feet wide, has more than 1,000 seats. Rose and rust are the main colors, blending nicely with the various shades of green and pastel shades elsewhere in the room. The chairs are upholstered in a rust-colored material.

The Kayton Theatre is fully air-conditioned. The heating equipment works as an integral part of the air-conditioning system and at all times throughout the year the theatre will be comfortable from an atmospheric standpoint.

While the theatre is not unique in having no balcony, it may be considered so in having no formal loge-promenade. The theatre was designed to ample seating on the main floor and, because of the over-all length of the lobby, a loge-like area was made out of the innermost third of the entrance way.

The projection room, film-repair room, the room where batteries are kept for the emergency lighting system, and a room where a part of the air-conditioning system is set occupy the space over the foyer.

As the theatre opened, it operated on a two-changes-a-week basis, with a top adult price of 55 cents, with the management pledging to "strive to provide Franklin with the newest and best movie features as they are produced and that every measure will be taken to provide for the comfort and entertainment of patrons."

Plans and designs of the Kayton Theatre are copyrighted by Victor A. Rigaumont, Pittsburgh, architect, who has reserved all rights.

THE FRONT OF THE KAYTON THEATRE is notable for the lack of sign letters and advertising, no less than for a design that causes the marquee to encompass the whole frontage of the property, the drug store no less than the theatre entrance itself. Under the particular conditions of Franklin, perhaps, it was felt that the swinging sign suspended from the soffit would be quite sufficient. Below the marquee, the front is of cream and green Carrara structural glass, with a dark green stone at the base. Above the marquee, the building is finished in yellow brick. The box office is large and made of dark green stone and corrugated glass.

THE AUDITORIUM, looking toward the rear (above), well shows the position of the projection machines, the rewind room, and the spots and effects machine. The auditorium walls are covered with a striped material, largely rust in color, below which is a dado finished to give the effect of green marble. Lighting is indirect.

THE MAIN LOBBY, between the box office and the doorman (left), has the expanse of wall broken by large mirrors and, on the right, an exit and the manager's office. The ceiling design and the decorative touches on the walls are well executed examples of modernistic art which blend into the over-all decor of the lobby area.

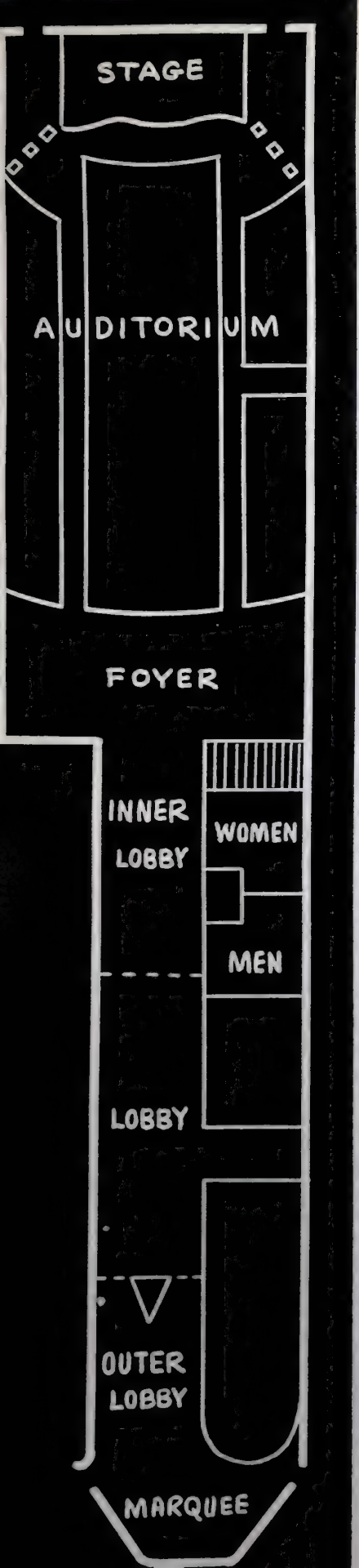
THE MAIN LOBBY, looking toward the box office (lower left), better shows the use of the two large mirrors placed vis-a-vis. The centrally located box office, made of dark green stone and corrugated glass, easily serves to divide the incoming and the outgoing patrons, so that no traffic jams are encountered in this area.

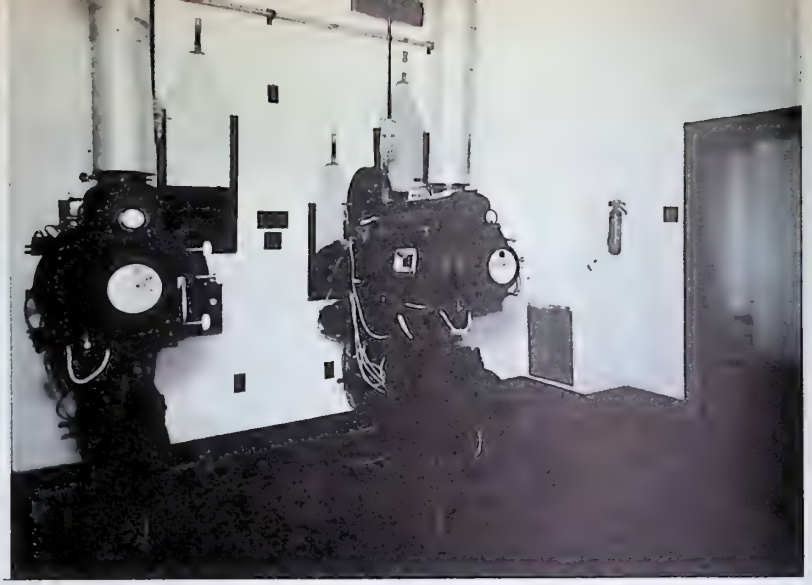
A CORNER OF THE STANDEE AREA (below) shows the simplicity of the foyer decoration. The vertical panel effect is obtained by broad alternating stripes of gray and rust, with a narrow border to set them off properly. The torchier in the corner adds a homely touch, while the water cooler in its recess adds convenience.

THE AUDITORIUM OF THE KAYTON THEATRE has been designed for perfect acoustics, as well as to create a satisfying and restful atmosphere for the complete enjoyment of motion pictures. Beneath the striped wall fabrics, with rust the predominent color, there is inch-thick sound felt and rock wool, with the exposed portions of the wall and the columnar effect being faced with Sabinite acoustical plaster. The dado has been finished to resemble green marble. The stage hangings blend with the color scheme of the rest of the auditorium, where coral, gold, and green have been very effectively used.

THE CANDY STAND and popcorn machine are set in a special recess, between the men's and ladies' lounges, right on the main line of entrance in the inner lobby. The candy counter affords a wider display of stock and a consequent greater inducement for purchasing one's favorite confection. Popcorn is its own best salesman.

THE INNER LOBBY, in the long view, better shows the position of the candy bar and the popcorn machine, as well as the area that looks more like a mezzanine promenade than part of the main entrance way. Smartly modern, from the ceiling artwork to the furniture, the inner lobby is designed for relaxation and comfort.





PROJECTION ROOM OF THE KAYTON THEATRE is spacious, with plenty of arm and work room around and between the projection machines. Note the position of the carbon-dioxide fire extinguisher, reached easily and quickly and ready for any emergency. Another point of "good working conditions" is the convenience of a private lavatory and toilet for the projectionists. The projection and observation ports are shuttered and protected.

REFERENCE CREDITS

THE KAYTON THEATRE

Franklin, Pennsylvania

OWNER: L. T. Houghton and Paul V. McKay.

OPERATOR: Kayton Entertainment Company.

ARCHITECT: Victor A. Rigaumont.

DECORATOR: Garbo Decorating Company.

GENERAL CONTRACTOR: H. T. Osburn and Company.

SEATING CAPACITY: 1,100.

COST OF BUILDING, INCLUDING AIR CONDITIONING: $200,000.

COST OF EQUIPMENT: $25,000.

AIR CONDITIONING: Deep-well system, with water coils by Trane Company and pump by Pomona.

CARPET: Crestwood, by Alexander Smith and Sons Carpet Company.

CHAIRS: Bodiform, by American Seating Company.

CHANGEOVERS: Strong Zipper, by Essannay Electric Manufacturing Company.

CURTAIN CONTROLS AND TRACK: by Automatic Devices Company.

DISPLAY FRAMES: Sealuxe, by Universal Corporation.

DRAPERIES AND STAGE CURTAINS: through Charles H. Kenney Studios.

FILM CABINETS: Neumade, by Neumade Products Company.

LENSES: Super Cinephor (Balcoted), by Bausch and Lomb Optical Company.

LIGHTING FIXTURES: by Rambusch.

PROJECTION LAMPS: Peerless Magnarc, by J. E. McAuley Manufacturing Company.

PROJECTION MACHINES: Simplex E-7, by International Projector Corporation.

RECTIFIERS: Copper-oxide type, 60 amperes, by General Electric Company.

REWINDERS: GoldE Model D, by GoldE Manufacturing Company.

SCREEN: Walker PM, by Walker American Corporation.

SIGN AND MARQUEE: by Flexlume Sign Company.

SOUND: Simplex A-30, by International Projector Corporation; and Voice of the Theatre speakers, by Altec Lansing Corporation.

SUPPLY DEALER: National Theatre Supply Division of National, Simplex-Bludworth, Inc.

TICKET-ISSUING MACHINE: Automaticket, by General Register Corporation.

TICKET BOX: by GoldE Manufacturing Company.

VENDING MACHINES: through Berlo Vending Company.

WALL FABRICS: through Charles H. Kenney Studios.

THE FLOOR PLAN shows what can be done with an unusually long and narrow lot, here 150 feet long but only 40 and 60 feet wide. By setting the box office some distance back of the building line, then dividing the rest of the space into two parts—thus making an outer lobby, lobby, and inner lobby—the forbidding aspect of an interminable walk has been eliminated. The shape also made it possible to put lounges and offices on one floor.

Sidney B. Lust and A. S. Kay Bring a Washington-like Theatre to a New Maryland Development

THE KAYWOOD THEATRE

Within the limits of Mount Ranier, Maryland, just over the line from the District of Columbia, Kaywood Gardens has been developed as a residential district for government workers and business people.

The theatre, whose architectural plainness shows external kinship with its Capital sisters, is wholly fire-proof, with a skeleton frame of structural steel, cavity-type masonry walls, and a 2½-inch poured gypsum room.

As part of a neighborhood shopping district, the Kaywood occupies a lot about 100 by 200 feet, with the lobby end of the theatre flanked by stores.

While there is no balcony, the mezzanine area over the entrance vestibule and foyer is utilized for more than the projection room, for here are located the nursery and the ushers' and projectionists' locker rooms. There is also a light tower room which provides facade lighting and also contains the emergency battery lighting equipment.

The auditorium has been designed with a short throw (108 feet) better to serve the needs of the theatre when television comes.

THE ENTRANCE FACADE of the Kaywood is faced with Indiana limestone, with the marquee and sign finished in baked enamel steel and trimmed in stainless steel. Doors are of Herculite, frames of stainless steel.

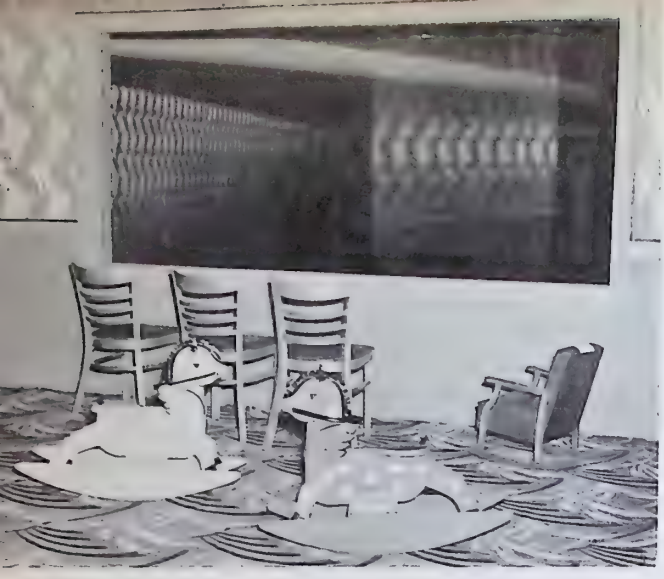
THE VESTIBULE (above) contains the box office, entrance to which is gained only from the manager's office. Illumination is from grilled fixtures fully recessed into the ceiling and worked into the design of the ceiling in a series of circular panels. The doors from the street to this vestibule, and from this vestibule into the adjoining foyer, or main entrance lounge are all-glass Herculite doors hung in stainless steel casings and trim of the same metal.

OFF THE FOYER are the ladies' powder room (left) and the men's smoking lounge (right). The former is done in a blue-green motif, with silk damask on the walls, and furnished in modern decor on the same style as the foyer. The men's lounge is finished in green and brown, with silk damask on the walls, and furnished in keeping with the other parts of the theatre. The toilet areas have all-tile floors and walls and china plumbing.

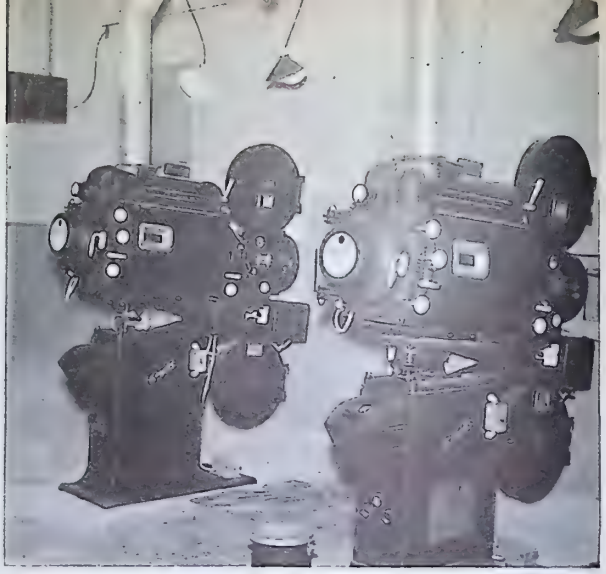
THE FOYER, or entrance lounge (below), is entirely finished from floor to ceiling in hardwood Flexwood, set in matched flush panels, with the lighting cove which runs completely around the room grained to match the Flexwood. Lighting is of the cold-cathode type. To maintain the uniformity of wall finish, legally-required metal-clad doors facing on this foyer were made of flush construction, in turn covered with Flexwood. Sumptuousness marks the furnishing.

THE 946-SEAT AUDITORIUM is decorated in modern style. The walls are surfaced with a protecting dado of Flexwood and from the top of the dado to the ceiling are surfaced with a scintillating silk brocade. The proscenium frame is designed as a modern colonnade and canopy, flanked on either side by allegorical murals.

THE REAR AUDITORIUM WALL, as a result of sound analyses, was acoustically treated with a backlining of felt and overlaid with the same type of brocade as used on the side walls. The general auditorium lighting is by means of downlights fully concealed in the ceiling construction. The screen-side murals are cove-lighted.



THE NURSERY is accessible by a staircase from the rear of the auditorium. It is for the use of patrons with infants or small children who might become restless during a performance. The nursery is decorated to harmonize with the auditorium, and is furnished with play pens, cribs, and large toys for the children.



THE PROJECTION BOOTH is 30 feet long and 16 feet wide and constructed wholly outside the rear auditorium wall. The booth, large enough to include future television equipment, has been equipped with Simplex E-7 projectors, Peerless lamps, and RCA sound. Here are the spotlights, and curtain and stage-lighting controls.

REFERENCE CREDITS

THE KAYWOOD THEATRE

Mount Ranier, Maryland

OWNER: A. S. Kay.

OPERATOR: Sidney B. Lust.

ARCHITECT: Frank G. Ackerman.

DECORATOR: Battisti Studios.

GENERAL CONTRACTOR: M. Cladny Construction Company.

SIZE OF LOT: 100 by 200 feet.

SEATING CAPACITY: 946 persons.

COST, INCLUDING AIR CONDITIONING: $182,000.

AIR CONDITIONING: Rotary Freon compression system, by York Corporation.

CARPETS: Crestwood, by Alexander Smith and Sons Carpet Company.

CHAIRS: Bodiform, by American Seating Company.

COIN CHANGER: Lightning Changer, by Johnson Fare Box Company.

DISPLAY FRAMES: Sealuxe, by Universal Corporation.

DRAPERIES AND STAGE CURTAINS: by Novelty Scenic Studios.

GENERATORS: by Automatic Device Company.

LENSES: Super Cinephor (Balcote-surfaced), by Bausch and Lomb Optical Company.

LIGHTING FIXTURES: by Rambusch.

PROJECTION LAMPS: Peerless Magnarc, by J. E. McAuley Manufacturing Company.

PROJECTION MACHINES: Simplex E-7, by International Projector Corporation.

REWINDERS: Deluxe Model D. H., by GoldeE Manufacturing Company.

RUBBER MATS: by United States Rubber Company.

SCREEN: Retiscope, by Retiscope Screen Company.

SIGN AND MARQUEE: by Continental Signs, Inc.

SIGN LETTERS: Adler, by Adler Silhouette Letter Company.

SOUND: Photophone, by Radio Corporation of America.

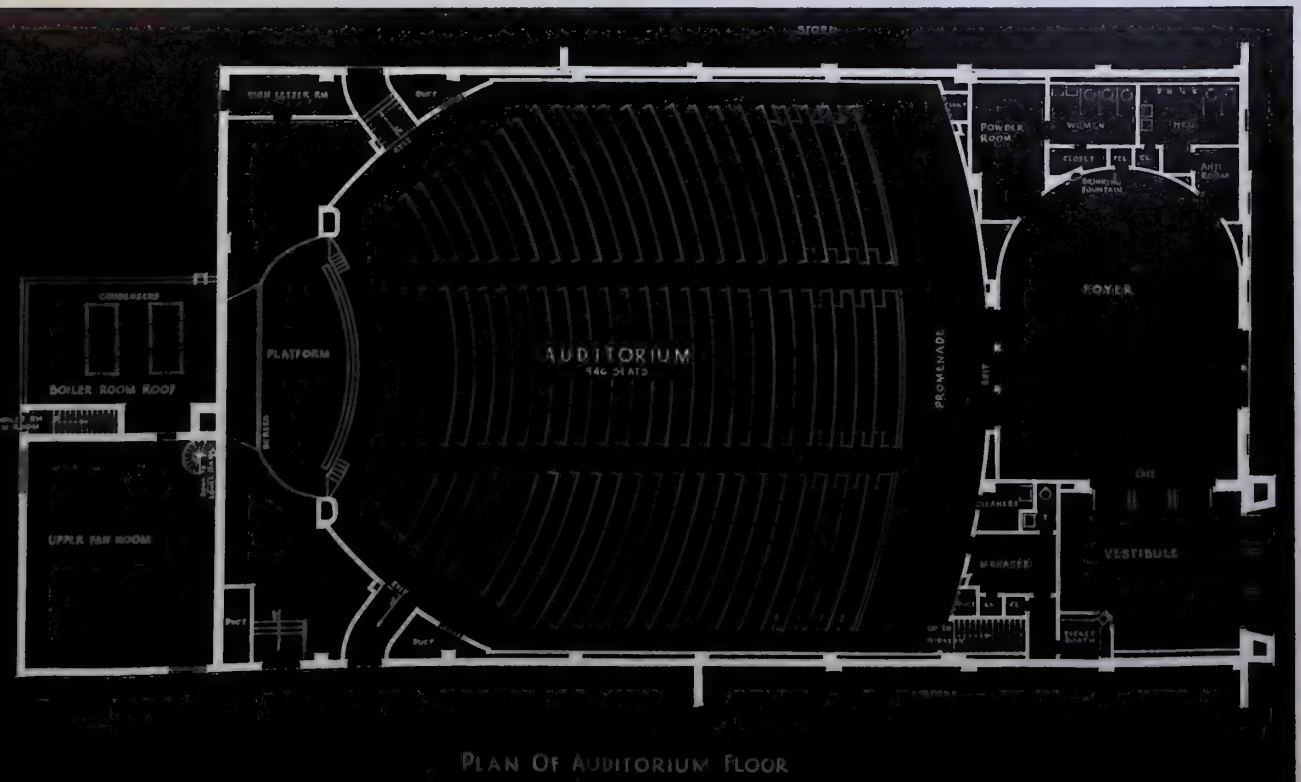
SUPPLY DEALER: National Theatre Supply.

TICKET-ISSUING MACHINE: Gold Seal, by General Register Corporation.

VENDING MACHINES: by Berlo Vending Company.

WALL FABRICS: by Novelty Scenic Studios.

THE LAYOUT of the Kaywood Theatre is inclusive of a large entrance vestibule, with the ticket booth inside for the adequate protection of patrons in inclement weather. The vestibule is 25 feet square. The ticket booth is accessible only through the manager's office which, in turn, is accessible only from the rear of the auditorium. This arrangement permits the manager's office directly to control the ticket booth, while at the same time the screen is subject to view from the manager's office by a special viewing porthole in the auditorium wall. The entrance lounge (foyer), at right angles to the vestibule, is 35 feet wide by 47 feet long.



PLAN OF AUDITORIUM FLOOR

Neither Upright Sign nor Proscenium Arch Grace the Theatre in Scottsbluff, Nebraska

THE MIDWEST THEATRE

THE CANDY STAND is located at a corner of the carpeted lounge, and is designed as part of the building, with ample display space for both bar and boxed types of candy. The L-shaped counter also allows for an expanse of out-in-the-open display of fast-moving items. The mirrored walls add a further aspect of spaciousness.

THE BOX OFFICE (seen here from the lounge area) is inside and across the lobby from the solid glass entrance doors. The floor is terrazzo in two tones of gray with triangular segments bounded by stylized eight-point outline star of darker color, all ringed by another band of the darker color. Lobby has four poster frames.

THREE EASY STEPS lead from the lounge into the foyer at either side of which are doors leading into the auditorium. Candy counter is at the left of these.

The Midwest Theatre, in Scottsbluff, Nebraska, presents a number of unusual treatments, besides being a multiple amusement venture by the Midwest Amusement and Realty Company, of which W. H. Ostenberg, Jr., is managing director.

The outstanding characteristic of the exterior is the absence of the traditional upright sign, as will be noted in the picture on the preceding page. Instead of the sign, the front of the massive pylon is faced with grillework in three narrow vertical panels, with a design of eight-pointed, somewhat cruciate stars, said to have been designed after the Singing Stars tower at the San Francisco world's fair. The front is finished in green terra cotta and cream stucco.

The distinguishing characteristic of the interior is Architect Charles D. Strong's treatment of the screen end of the theatre: the elimination of the traditional proscenium arch and the substitution of decorative wall ends that curve toward the rear, allowing the setting of a near theatre-wide cyclorama behind which are hung the regular curtains.

The building itself is constructed with masonry walls, reinforced concrete floors and balcony, with steel trusses, metal lath and plaster ceiling, and Haydite roof slabs.

The plain, light-decorated marquee, surmounted by the theatre name in single letters, is devoid of signwork. Two program boards—about as wide as the marquee is deep—are mounted above the marquee. Another program board runs the entire width of the theatre below the ceiling of the marquee.

A further point of interest in the Midwest property is the inclusion of a billiard parlor in the excavated basement portion of the building below the auditorium proper, thus making a revenue-producer out of this portion of the theatre at little additional cost.

A TWELVE-TABLE BILLIARD PARLOR has been built in the basement of the theatre building, as a further attraction. The additional costs of excavation are more than offset by the advantages to be derived from this "center" operation. The equipment—and lighting—is as modern as the theatre. A particular advantage of a development like this is that the heating and air-conditioning facilities can be extended with little more expense than for the theatre alone. With proper design, in architecture and construction, the theatre auditorium is positively insulated against the possibility of any disturbing noises that might be emanating from this room.

THE AUDITORIUM of the Midwest Theatre reveals an architectural treatment almost the reverse of the traditional. Instead of the usual proscenium-arch effect, the walls at the screen have cut back from the stage level to a point that makes the ceiling line about twice as long as would normally be encountered. The extended width affords the decorator opportunity for a greater use of cycloramic drapes and valances in pleasingly contrasting colors.

REFERENCE CREDITS

THE MIDWEST THEATRE

Scottsbluff, Nebraska

OWNER AND OPERATOR: Midwest Amusement and Realty Company (affiliated with Gibraltar Enterprises, Inc.), W. H. Ostenberg, Jr., general manager.

ARCHITECT: Charles D. Strong.

DECORATOR: Arnold E. Savage.

SIZE OF LOT: 50 by 140 feet.

SEATING CAPACITY: 920 persons.

COST OF BUILDING: $100,000.

COST OF EQUIPMENT: $35,000.

AIR CONDITIONING: by United States Air Conditioning Corporation.

CARPET: Crestwood, by Alexander Smith and Sons Carpet Company.

CHAIRS: Push-Back, by Kroehler Manufacturing Company.

CHANGEOVERS: RCA Brenkert, by Brenkert Light Projection Company.

CURTAIN CONTROLS AND TRACK: Vallen, by Vallen, Inc.

DRAPERIES AND STAGE CURTAINS: through Metropolitan Scenic Studio.

LENSES: Snaplite, by Kollmorgen Optical Corporation.

PROJECTION LAMPS: RCA Brenkert, by Brenkert Light Projection Company.

PROJECTION MACHINES: RCA Brenkert Model BXA, by Brenkert Light Projection Company.

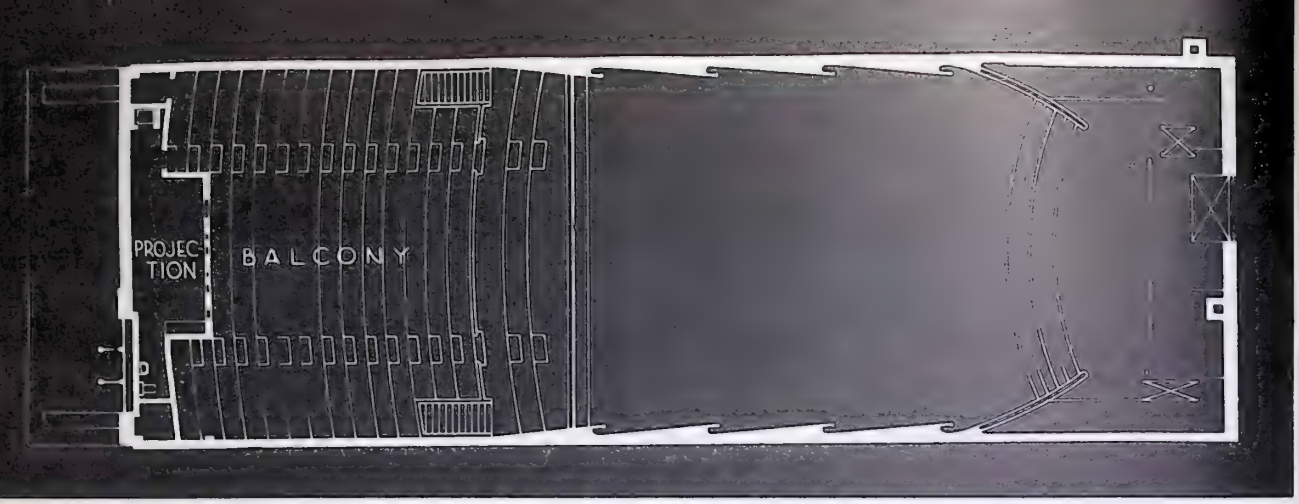
SIGN AND MARQUEE: by Art Neon.

SIGN LETTERS: Wagner, by Wagner Sign Service.

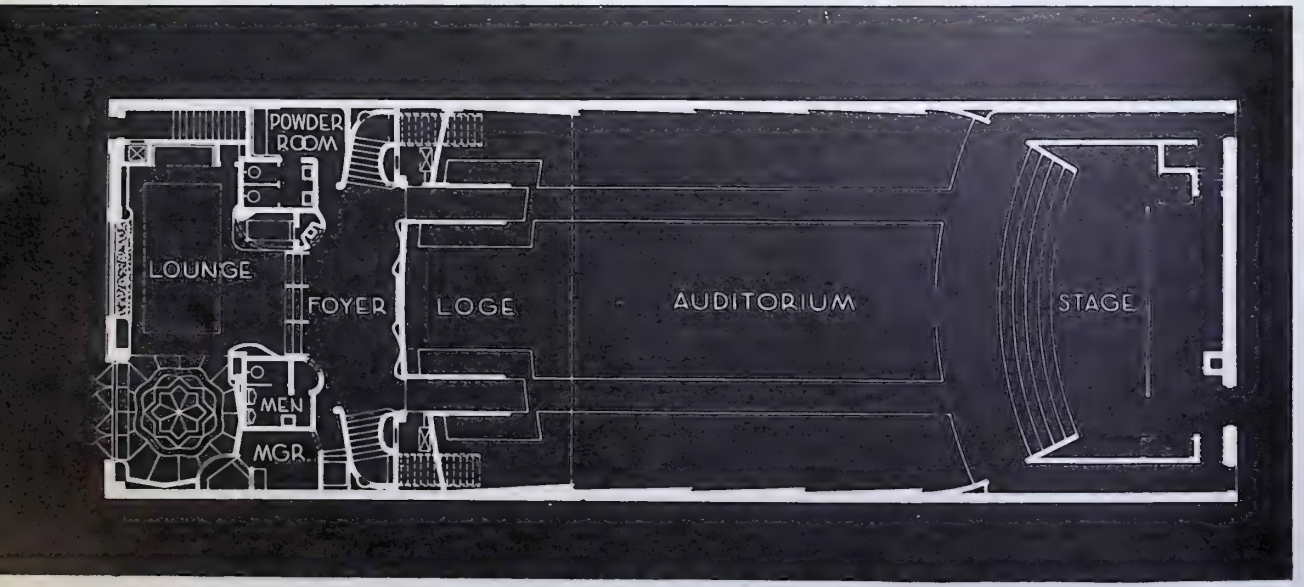
SUPPLY DEALER: Western Service and Supply, Inc.

TICKET-ISSUING MACHINE: Automaticket, by General Register Corporation.

LOOKING TOWARD THE REAR, the wall treatment is emphasized, showing the flaring panels. While the tiers of balcony seats are set on a curve, the face of the shelf is flat, and contains twelve floodlights for illuminating the stage area. Spotlights can be installed in the projection booth. The walls and ceiling of the auditorium are of blue plaster, with blue neon running lights. The foliate ornamentation in shades of green, cream, and peach.

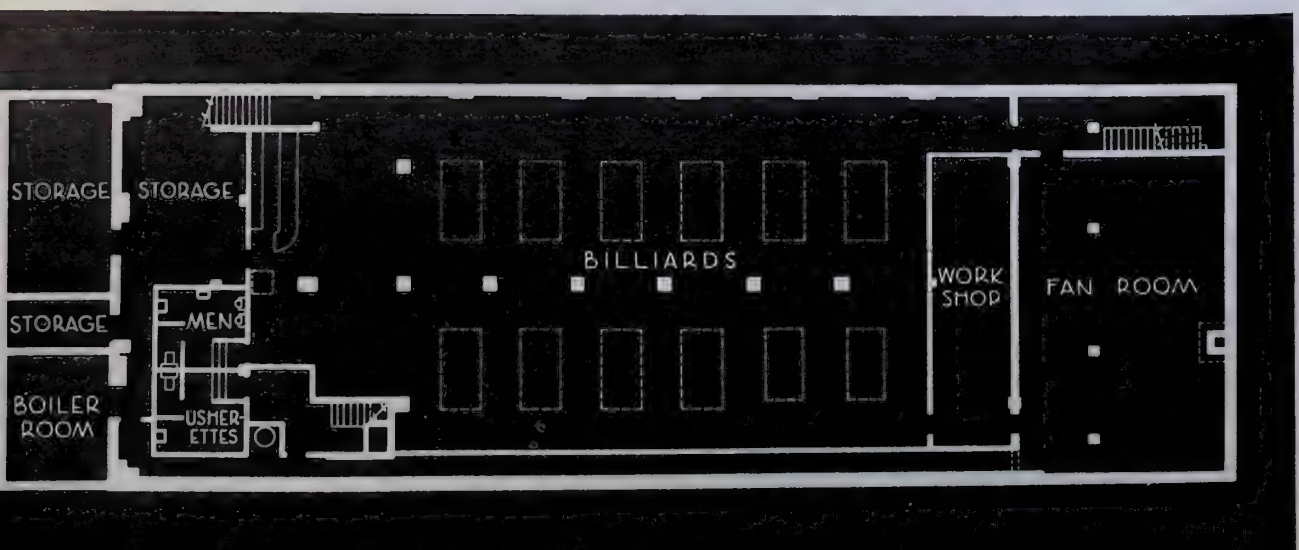


THE BALCONY PLAN shows the curvature of the various tiers of seats, even though the face of the shelf has been made perpendicular to the axis of the side walls. Also better appreciated is the distal flaring of the wall panels, a construction feature which not only adds decorative effectiveness but also tends to improve the acoustic characteristics of the auditorium. The projection room is spacious, providing plenty of room for working at the projectors as well as operating spotlights and special effects machines. With the platform-type of stage, there is a lot of room, even without the necessity of moving screen or any other permanent items.



THE FIRST FLOOR PLAN shows the efficient arrangement of the various rooms. Note particularly the way the manager's office backs up to the boxoffices, so that neither tickets or money have to be moved in the public portions of the theatre. Lounge and foyer are the reverse of the more traditional arrangement, but yet an effective arrangement that permits a street-side window for a bit of natural illumination in spite of the fact that a translucent, not clear, glass is used.

THE BASEMENT PLAN shows the layout of the billiard parlor, without curtailing the house facilities of the theatre itself. Note how a corridor connects the fan room with the front portion where are located the usherettes' room, storage rooms, and the boiler room. The work shop is arranged so it may be used by both the billiard parlor and the fan room. Note, generally speaking, that the billiard parlor, reached by the door and stairs at the right side of the facade, is quite independent from the theatre, although there are rooms that can be jointly shared. A candy and business counter backs up to the parlor's storage room for convenience in operation.



A Theatre Becomes the Focal Point of a New Warrington, Florida, Community Development

THE NAVY POINT THEATRE

Navy Point, near Warrington, Florida, hard by the Navy's famed air base at Pensacola, is typical of the war-born communities that seem destined to live on in a world at peace because of the substantial and forthright planning in its execution and development.

How this community came into being is set forth in the article, "Navy Point, Streamlined Community Center," by Francis B. Johnson, on pages 174 and 175, to which the reader is referred for the communal aspects of the development.

The Navy Point Theatre, which, with the multiple-venture store building, dominates the business center of this community of 750 homes, was designed by Harry Pembleton and built at a cost of $150,000. The completely fire-proof building is constructed of brick, concrete, and steel, with a facade faced with Italian Barrisina marble and stucco.

The marquee facing and sign carry out the Navy color scheme of blue and gold (yellow), with just a touch of red to set it off. The soffit is lighted with fluorescent lights. There are eight entrance doors—four doublets.

The walls of the lobby and foyer are finished in maple panels, finished in natural color. The walls resemble a fine piece of furniture, as they were hand rubbed between each coat of varnish and, in the final finish, were rubbed with oil and pumice to a velvety finish. A spacious concession space, properly equipped and having a marble serving counter both in the lobby and on the street side, occupies a prominent place.

Off the foyer are the ladies' powder room and lounge, fitted with individual makeup tables and modernistic chairs.

The luxurious drapes adorning the standee area are of a rich maroon velour, made in such a way that it touches the floor to make a modern, rich appearance.

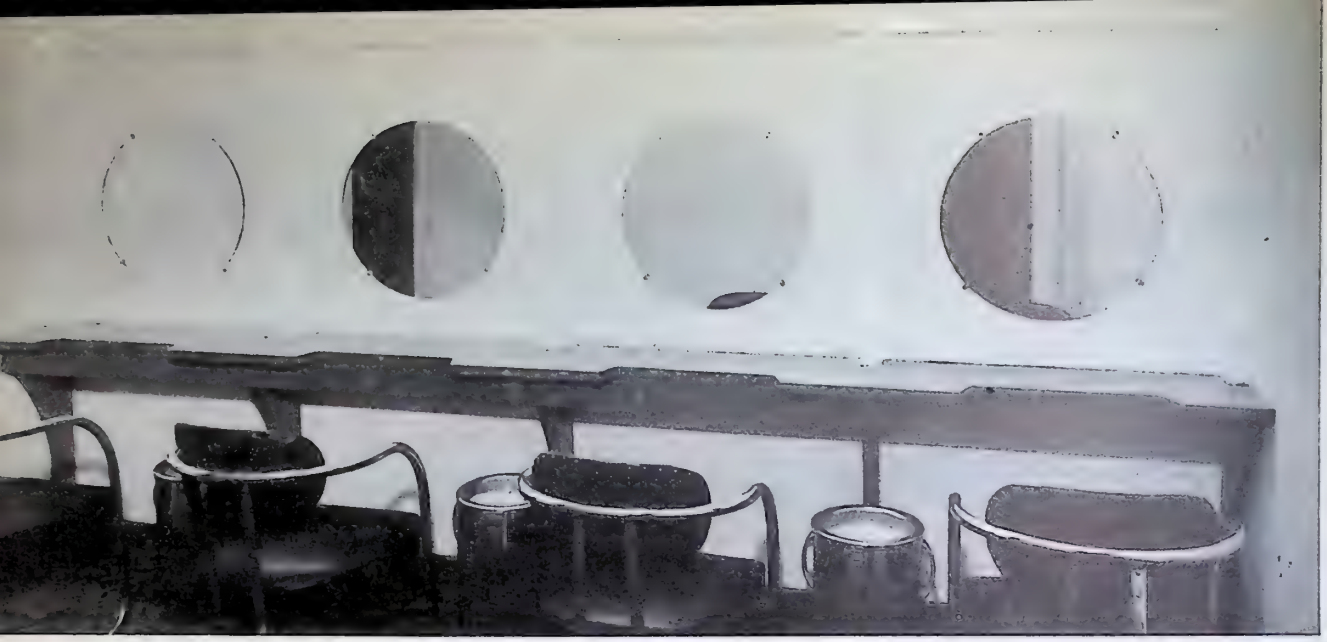
The auditorium is finished modernistically, the walls being perfectly plain and finished in large Celotex sheets of soundboard. The seats are fully upholstered and finished in coral colored mohair backs.

The stage is luxurious. The grand drape is of rich maroon velour. The valance is of the same material, trimmed with an 8-inch gold fringe. The bottom of the curtain has an 8-inch gold band and then the same gold fringe on the valance. Behind this curtain on each side are the legs of royal blue, trimmed in gold. Just in front of the motion-picture screen is gold velour screen curtain.

On the second floor, besides the spacious projection room (is a cry room. It is interesting to note also, in this connection, that the development's business center provides day nursery facilities. The cry room is said to be the first in this part of Florida, and is making quite a hit.

As the theatre opened, the policy embraced four changes a week, with an admission of 40 cents for adults and 16 cents for children.

THE NAVY POINT THEATRE is built from a framework of 70 tons of structural steel with walls of 8-inch hollow tiles, faced with brick. The front of the building below the marquee line is of Italian Barrisina marble. Above the marquee there is stucco painted a cream color. The marquee has nine channel letters, spelling out the words Navy Point. It is done in blue, gold, red, and green. The theatre is located as the center of the Navy Point development, catering, within a radius of two miles, to some 25,000 civilians and Navy personnel. Within the business area are included all the various types of businesses necessary to the community.



THE LADIES' LOUNGE AND POWDER ROOM (above) is carpeted in a blue flowered pattern. The room is provided with individual makeup tables, with chairs of chrome metal and blue leather seats and backs. The toilets are done in cream-colored ceramic tile. The men's and ladies' lounges are located off the foyer, the former being at the right side of this area and the latter at the left side. In promoting convenience, these lounge rooms have been designed to be as deep as the side seating area of the auditorium is wide, thus eliminating many of the curves usually encountered in the more elaborate theatre designs.

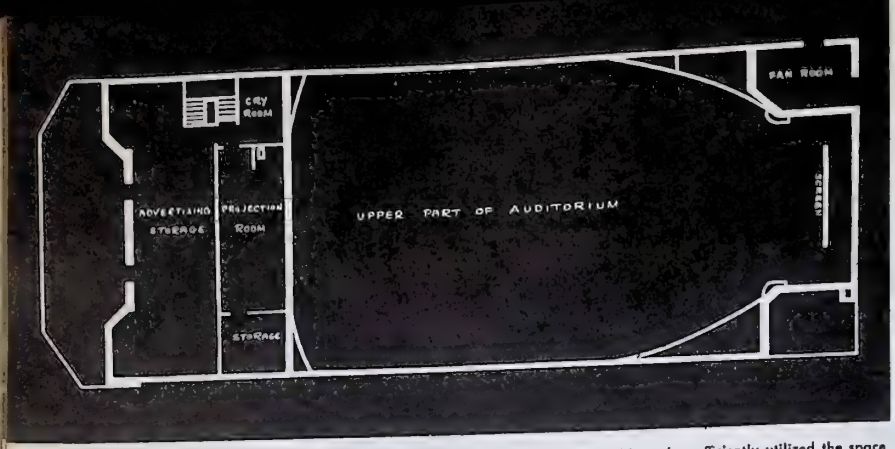
THE CRY ROOM (left), located side of the projection room, is the only one of its kind in this section of Florida, even including Pensacola itself. The room has proved to be one of the most popular spots in the theatre, indicating that mothers appreciate this added convenience at the Navy Point Theatre. The room is equipped with a plate glass window for unobstructed vision to the screen, and with a monitor speaker system tied in with the theatre's sound system. The room is comfortably furnished and quite sound-proof as regards the auditorium proper, no matter how obstreperous the tired children may be.

THE PROJECTION ROOM (below) is larger than most booths and is completely air-conditioned for the comfort of the projectionists. On the other side from the cry room is a spacious storage area (which could later be converted into a special viewing room for private parties). The projection and storage rooms back up to a huge advertising storage space which is coextensive with the lobby, concession stand, and manager's office, located on the first floor. The latest equipment for projection and sound, including the speaker system back of the screen, has been installed to insure the best possible amusement results.

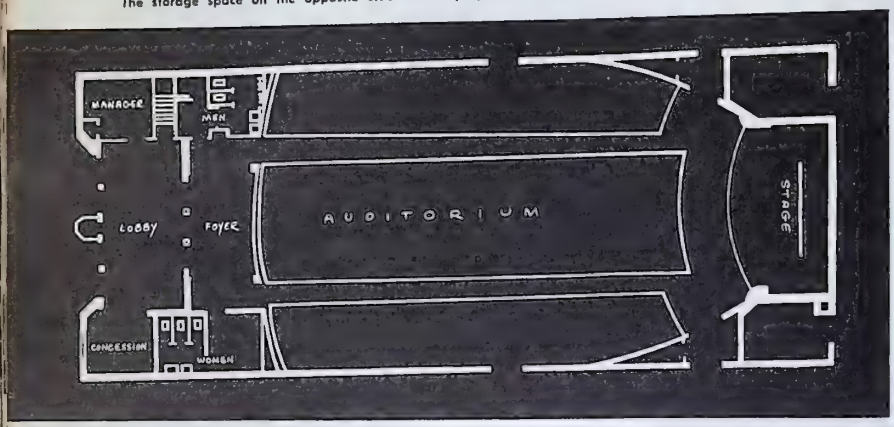
THE AUDITORIUM has its walls finished in 4-by-12-foot sheets of Celotex acoustical board, painted peach. The stage drapes are of heavy velour. The grand drape is maroon, with gold fringe and trim. The legs and border are rich blue, trimmed also in gold. The screen curtain is gold velour. The cool air from the air conditioning is distributed evenly by means of air diffusers. The seats are fully upholstered and finished in blue with coral-colored mohair backs. The deep-pile Wilton carpeting in the aisles is of the same pattern as that in the foyer. Everything is designed for the patrons' comfort and entertainment.

THE FOYER and standee space of the Navy Point Theatre is carpeted, and the walls are finished in natural-color maple panels. The standee drape is of the same material as the grand drape of the stage and is installed so that it hangs to the floor. The ladies' room is at the other end of the foyer, back of the cameraman.

THE LOBBY, like the foyer, has its walls finished in natural-color maple panels, but the floor is surfaced with buff colored tile. A concession stand is immediately on the right entering the theatre, just off the main line from the door to the ticket-taker. The manager's office is located across the lobby from this point.



THE FLOOR PLAN of the Navy Point Theatre show that Architect Harry Pembleton has efficiently utilized the space alloted to the theatre. By including all the necessary rooms on the first floor, considerable storage space is obtained on the upper floor. Also allowed is an ample projection room, beside which has been made a cry room. The storage space on the opposite side of the projection room could be made into a private party room. The storage space on the opposite side of the projection room could be made into a private party room.



THE NAVY POINT COMMUNITY has been laid out with the theatre and commercial center the heart of the development whose 15 miles of streets have, with the exception of Sunset Avenue, been named for those who have died as the result of aviation-training accidents in the Pensacola area. The broad white line crossing the bridge and swinging around to come in front of the commercial center is the route of Pensacola Transit busses.

REFERENCE CREDITS

THE NAVY POINT THEATRE

Warrington, Florida

OWNER AND OPERATOR: Francis B. Johnson.

ARCHITECT: Harry Pembleton.

DECORATOR: Oklahoma City Scenic Company.

SEATING CAPACITY: 750 persons.

COST OF BUILDING, EXCLUSIVE OF EQUIPMENT: $150,000.

COST OF EQUIPMENT, EXCLUSIVE OF AIR CONDITIONING: $35,000.

ACOUSTICAL MATERIAL: Celotex, by Celotex Corporation.

AIR CONDITIONING: Airtemp, 50 hp. plant, by Airtemp Division of Chrysler Corporation; installed by Emory D. Lee.

CARPET: Wilton, by A. and M. Karagheusian.

CHAIRS: by Ideal Seating Company.

CHANGEOVERS: Weaver, by Weaver Manufacturing Company.

COINCHANGER: Lighting, by Johnson Fare Box Company.

CURTAIN CONTROLS AND TRACK: Vallen, by Vallen, Inc.

DISPLAY FRAMES: Custom-made.

DRAPERIES AND STAGE CURTAINS: through Oklahoma City Scenic Company.

EMERGENCY LIGHTING SYSTEM: installed by E. D. Gruppe.

FILM CABINETS: Neumade, by Neumade Products Corporation.

LENSES: Snaplite, by Kollmorgen Optical Corporation.

LIGHTING FIXTURES: through Greybar Electric Company.

PROJECTION LAMPS: Suprex, by C. S. Ashcraft Manufacturing Company.

PROJECTION MACHINES: Motiograph, by Motiograph.

RECTIFIERS: by Forest Manufacturing Corporation.

REWINDERS: Golde, automatic and hand, by Golde Manufacturing Company.

SCREEN: Da-Lite, by Da-Lite Screen Company, Inc.

SIGN AND MARQUEE: by Neon Products Company.

SIGN LETTERS: Wagner, by Wagner Sign Service, Inc.

SOUND: Motiograph Mirrophonic, by Motiograph; with Voice of the Theatre speakers, by Altec Lansing Corporation.

SPRINKLER SYSTEM: Automatic, installed by the Pate Company.

SUPPLY DEALER: Hodges Theatre Supply Company

TICKET-ISSUING MACHINE: Automaticket, by General Register Corporation.

TICKET BOX: Golde, by Golde Manufacturing Company.

TIME AND SIGNAL SYSTEM: installed by E. D. Gruppe.

VACUUM CLEANERS: through E. D. Gruppe.

For a New Residential Section of Washington, K-B Theatres Creates a Center for Community Life

THE NAYLOR THEATRE

When Pierre Charles L'Enfant designed the city of Washington, he set the Capitol to face east in the fond hope that the city would develop in that general direction. But these great expectations were not realized, for the National Capital, like many another U. S. city, progressed in a northwesterly direction.

In the years prior to the war, however, increasing activities of the government drew more and more people to Washington and, because land values were somewhat lower, the part of the District of Columbia generally known as Anacostia began rapidly to grow. When World War II further augmented the Capital's population, the area grew even faster.

With appreciation of the entertainment needs of the new residents, Fred S. Kogod and Max Burka, owners of Washington's newest theatre circuit, built the Naylor Theatre on Naylor Road, just beyond the distal end of Good Hope Road.

Designed to meet the immediate entertainment needs of an estimated 20,000 folks of good middle-class standing, the theatre is constructed of brick and steel, with Indiana limestone as the finish material for the facade.

Since the area served by this theatre is so new—at the time of opening only "essential" businesses had been established to serve the community—meeting places for civic groups just did not exist. In the design of the theatre, there was a large space (about 30 by 50 feet) over the lobby which was not being finished, being reserved for future offices. But noting the needs of the community, and accepting the opportunity to be of still greater service, this space was finished and turned into a community assembly room, available on request at no charge to civic groups and local associations.

The nursery and, for private parties by arrangement, the Congressional Room are other features that should attract patrons to the 955-seat, $300,000 theatre.

FACED WITH INDIANA LIMESTONE, the Naylor Theatre presents the undecorated simplicity so characteristic of the newer theatres in the District of Columbia, the lack of embellishment—particularly on the marquee—being more a point of District regulation rather than architectural or theatrical modesty. The setback above the marquee was, in this case, a brilliant idea, for it permitted the interpretation of regulations in such a way as to permit the large silhouette letter sign. The theatre was designed by John J. Zink, and built by the M. Cladny Construction Company, and equipped largely through National Theatre Supply.

THE COMMUNITY ROOM puts to valuable civic purposes an expanse of floor space that was at first to be left unfinished and held for future office space. But to meet the demands for a community meeting place for local organizations, the theatre management decided to make this space available and, at the same time creating considerable good will, particularly as the services of the theatre, including air conditioning, served this room. Although seemingly bare indeed in this picture, the room can easily and quickly be equipped with such furniture as may be needed by the organization utilizing it at the time. No fees are made.

THE NURSERY (above) AND THE CONGRESSIONAL ROOM (below) afford that desirable separation or privacy that many patrons find conducive to the greatest enjoyment of motion pictures. Each room is equipped with its own monitor system tied in with the theatre sound. The sound-proof windows are made of two thicknesses of quarter-inch plate glass, with a dead-air space for insulation. The Congressional Room can be reserved.

REFERENCE CREDITS

THE NAYLOR THEATRE

Washington, D. C.

OWNER AND OPERATOR: K-B Theatres.

ARCHITECT: John J. Zink.

DECORATOR: Paramount Decorating Company.

BUILDER: M. Cladny Construction Company.

COST OF BUILDING: $250,000.

COST OF EQUIPMENT, INCLUDING AIR CONDITIONING: $50,000.

AIR CONDITIONING: by York Corporation.

CARPETS: Crestwood, by Alexander Smith and Sons Carpet Company.

CURTAIN CONTROLS AND TRACK: by Vallen, Inc.

DISPLAY FRAMES: Sealuxe, by Universal Corporation.

GENERATOR: Transverter, by Hertner Electric Company.

LENSES: Super Cinephor (Balcote-surfaced), by Bausch and Lomb Optical Company.

PROJECTION LAMPS: Peerless Magnarc, by J. E. McAuley Manufacturing Company.

PROJECTION MACHINES: Simplex E-7, by International Projector Corporation.

REWINDERS: automatic, by GoldE Manufacturing Company; Simplex (hand), by International Projector Corporation.

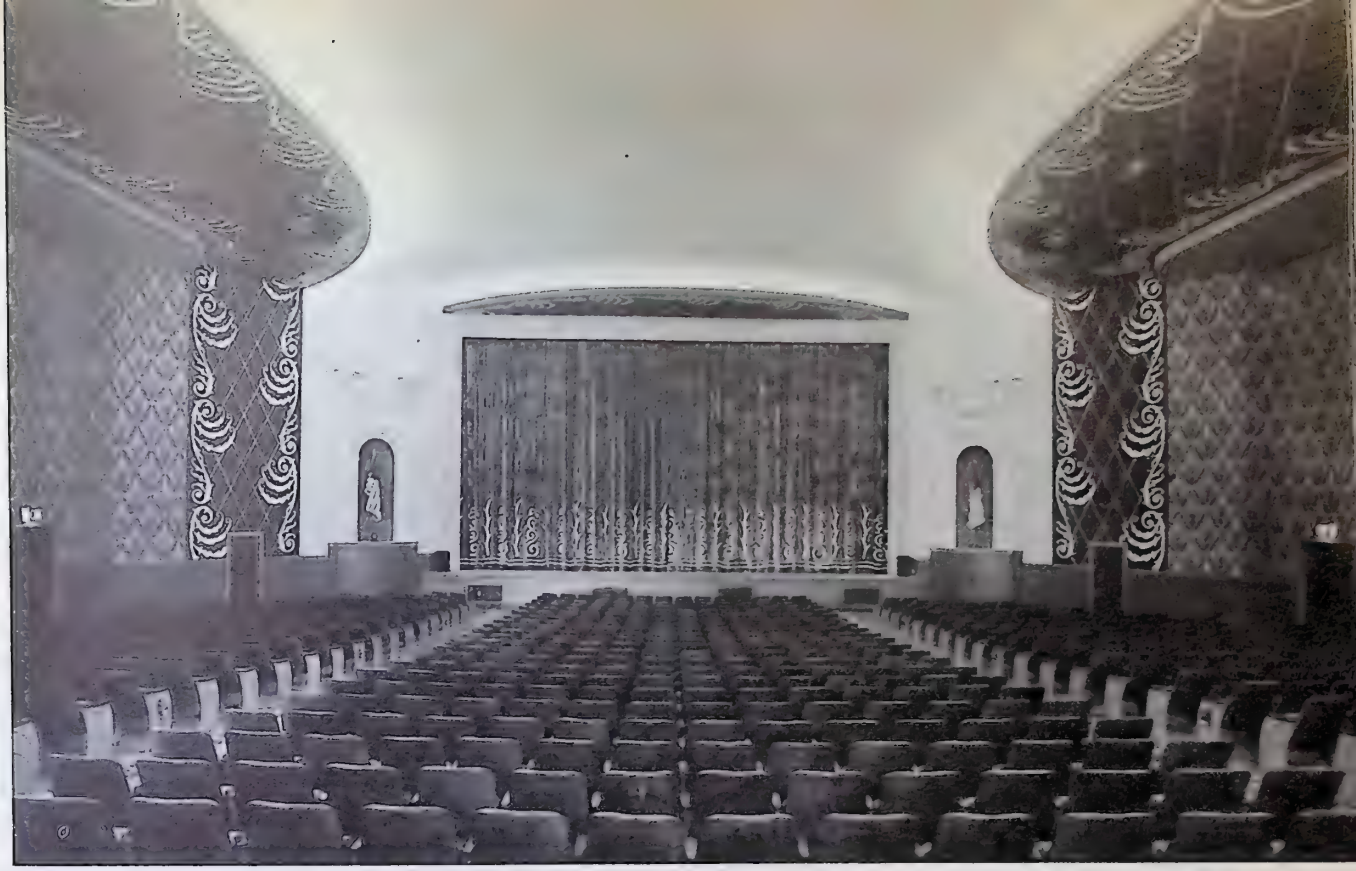
SCREEN: Plastic Molded, by Walker-American Corporation.

SIGN AND MARQUEE: Regal Neon Sign.

SIGN LETTERS: Three Dimensional, by Adler Silhouette Letter Company.

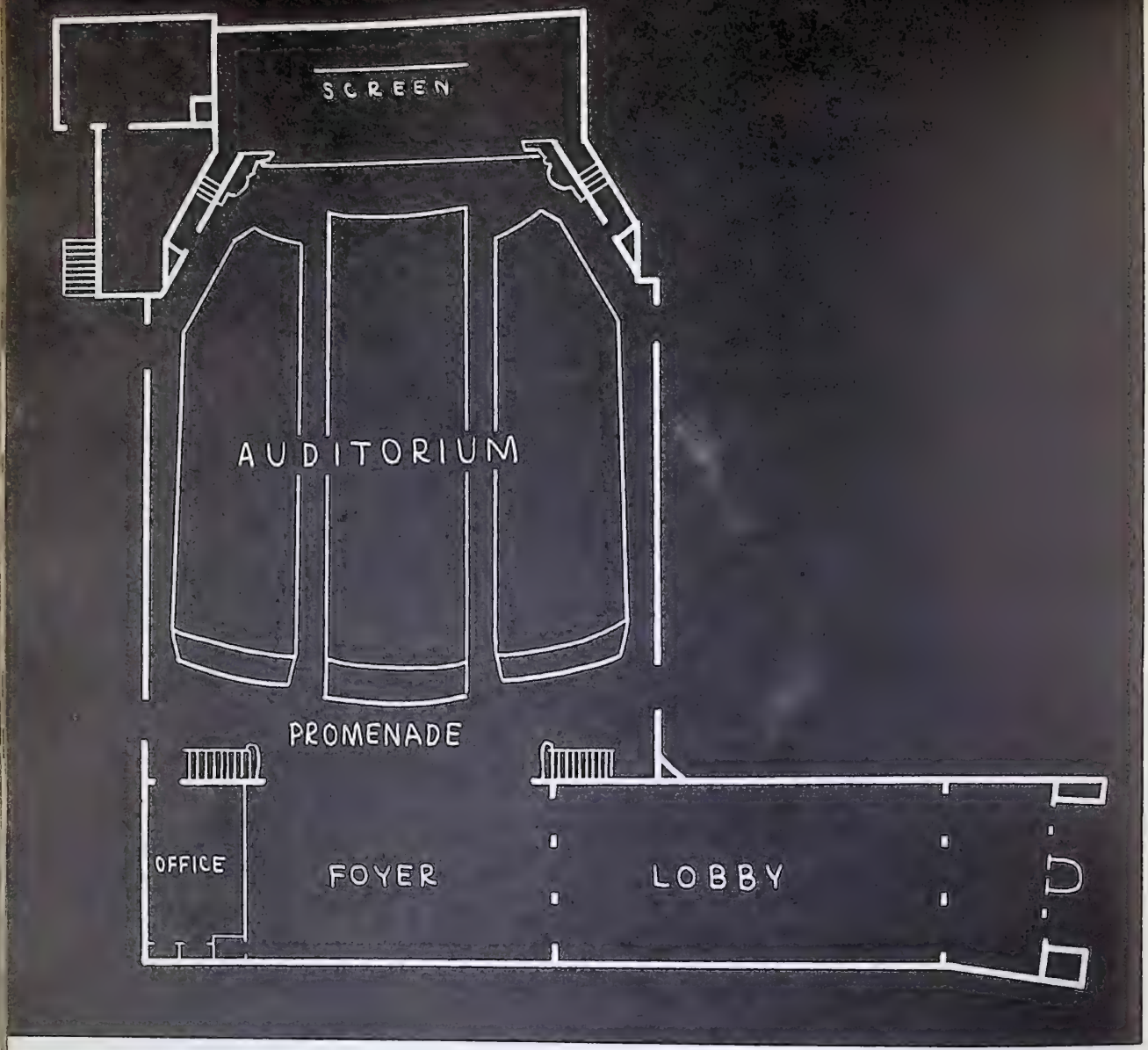
SOUND: Simplex A-30 (Four Star, with dual channel and complete emergency features), by International Projector Corporation.

SUPPLY DEALER: National Theatre Supply.



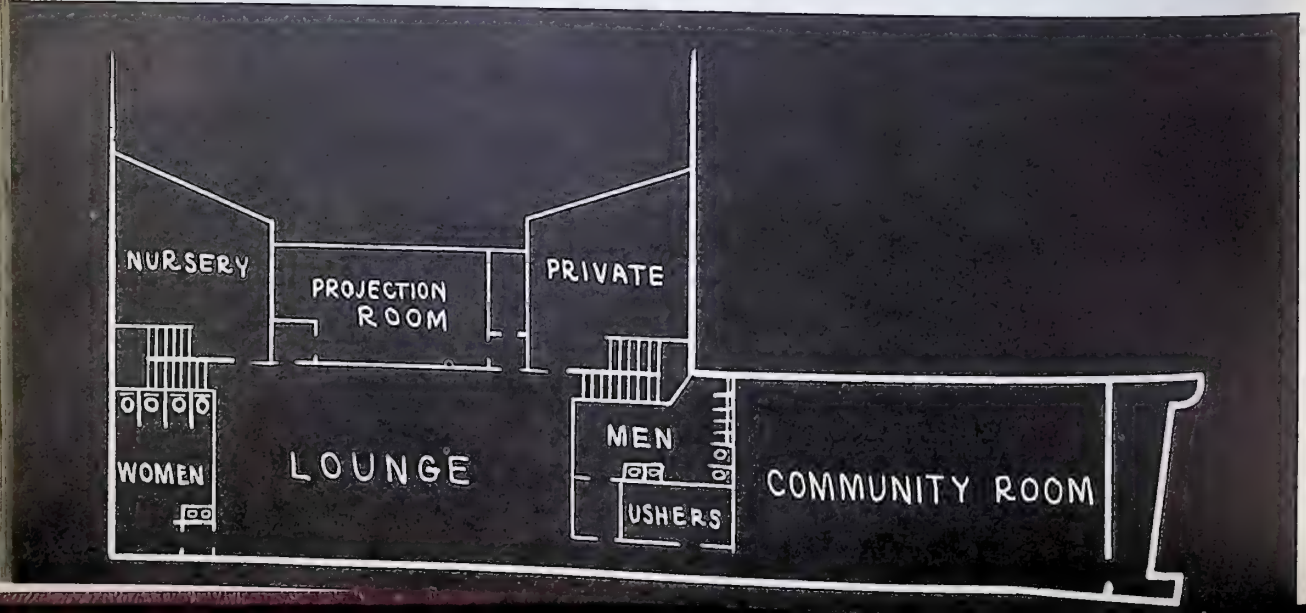
THE AUDITORIUM OF THE NAYLOR THEATRE presents the pleasing contrast of the white forepart of the theatre, and the ceiling, and the Williamsburg blue panels delimiting the red and gold fabric on the walls. The front stage curtain is maroon, with the second traveler of blue and the screen curtain of gold. Blue and ivory have been used as the prominent colors in the lobby and the foyer above the level of the 7-foot dado of walnut. The lounge rooms are paneled in a neo-Colonial design, with, again the Williamsburg blue and ivory as the chromatic motif. The acoustical material is rock wool, overlaid with damask of appropriate design.

THE MEZZANINE LOUNGE, off which at the far right is the nursery with the ladies' rest room at the left (the Congressional Room and the men's lounge are in comparable positions at the other end of the area) is a spacious, yet clubby part of the theatre, designed for relaxation and comfort of the theatre's patrons. Effective use has been made of a paneled neo-Colonial effect, with decoration in Williamsburg blue and ivory, in keeping with the general color scheme of the rest of the theatre. Throughout the theatre has been designed and decorated—and furnished—to ensure the maximum comfort and pleasure.



FROM THE BOX OFFICE the customer passes through a rubber-matted, terrazzo-bordered vestibule, and then through a long, luxuriously carpeted lobby, into a spacious foyer on the far side of which, up against the manager's office, is a candy counter. The boiler and compressor rooms are to the left of the screen.

ON THE SECOND FLOOR, a luxurius lounge dominates the area, off of which are the rest rooms, the nursery, the projection room, and Congressional Room. Here, too, is found the Community Room, to the right of which is a space reserved for storage of signs and letters. The fan room is over the boiler room at the screen end.



Paramount's Neighborhood Expansion Program Brings a Theatre in a Palm Garden to Phoenix, Arizona

THE PALMS THEATRE

Colorful ceremonies—highlighted by a specially-produced dedication trailer featuring a galaxy of Hollywood stars extending their congratulations to the circuit, the City of Phoenix, and the State of Arizona—opened in Phoenix the newest unit of Paramount Nace Theatres, Inc. operating a circuit of theatres in Arizona.

Based on the fact that neighborhood expansion was necessary, an extraordinary site was selected and it was decided to build a house of such design that it would set a standard of excellence.

The theatre, which seats 772, is of modern design in the native motif and in harmony with its surroundings.

A large free-standing sign with concrete base in front of the theatre emblazons the theatre name, below which is the attraction board set with silhouette letters.

Display areas exceed those in other jobs done by the same designers, and merchandizing possibilities are also furthered and incorporated.

The building is set in a palm garden, which includes a patio in which is sunk a sparkling pool. The surroundings are visible from the glass-enclosed lobby. The lobby and foyer are definitely residential in character and fit in the Phoenix locale. Carrying out the design motif, the foyer is lined with a display of Indian and local works of art—including paintings, sculpture, Indian relics, and the like—constituting a sort of local museum.

The auditorium was especially designed to take advantage of everything research has done to improve comfort and sound. Comfort is stressed, and, typically, the chairs (or the newest Push-Back type) are spaced 36 inches back to back. Accepting the premise that the picture is the focal point of the auditorium. This part of the theatre is simple and, in addition to its spacious seating, its only visual luxury is its contour curtain and cold-cathode lighting on dimmers, a system perfected in 1944. The latest sound equipment is used. Air conditioning is of the newest evaporative type.

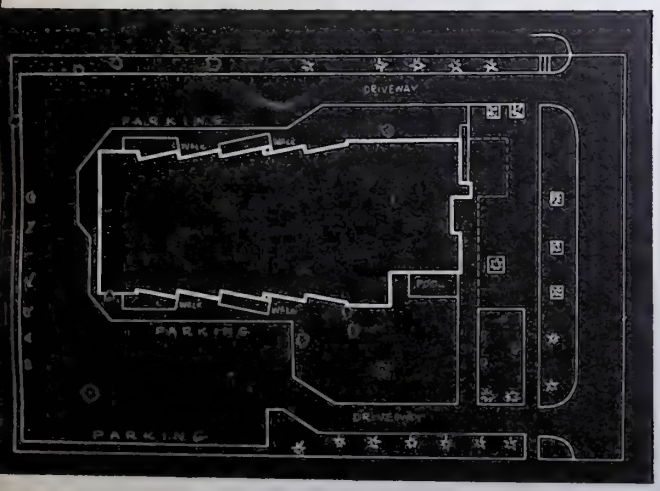
The landscaping—the large palms were already there—and pool became a part of the interior through its picture windows, illuminated at night.

Parking spaces are provided on either side and in back of the building and additional large parking spaces are nearby.

The theatre was planned and designed by Lescher and Mahoney, with Pereira and Pereira as consultants.

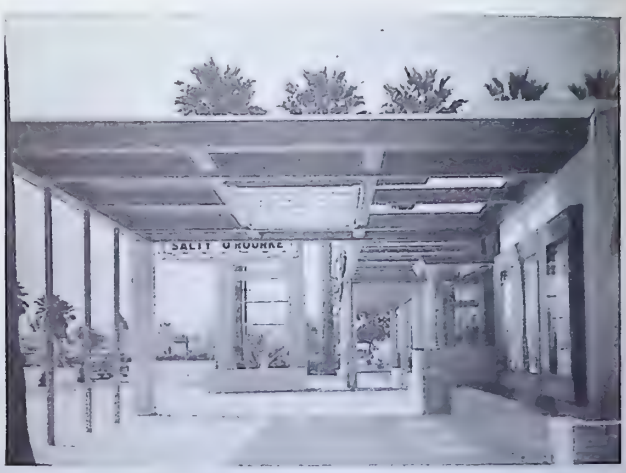
THE PALMS THEATRE is of modern design and decor, utilizing much of the themes of the locale and adapting all in harmony with the functional purpose of the building and the site. The building is set in a palm garden which includes a patio in which is sunk a sparkling pool viewed from the glass enclosed lobby. A large free-standing sign, with concrete base, in front of the theatre emblazons the name of the theatre below which in silhouette letters the title of the current attraction and the star names are set forth. Display areas exceed those in other theatres, even in those designed by the same theatre architects who were involved here.

AERIAL VIEW of the Palms Theatre, taken from 500 feet, shows the parking lot in the upper section of the picture, with a smaller lot on the lower side. The small oleander fringe around the larger parking lot will, when the shrubs attain the height of 5 to 7 feet, make a screen between the lot and adjacent homes.



THE PLOT PLAN (immediately above) shows that the theatre possesses more parking space than provided by the two formal lots, in the area at the sides and the rear of the cinema. Entrance is made by the upper driveway, exit by the lower one, from which the incoming customers would have the view shown below.

FROM ACROSS THE STREET, the garden setting (above) of the Palms Theatre can be appreciated. The theatre, constructed of reinforced concrete and steel, has the fore portion faced with a slightly off-white stucco, the auditorium portion faced with cream-colored brick. Pictured below is a closeup of a part of the theatre front.

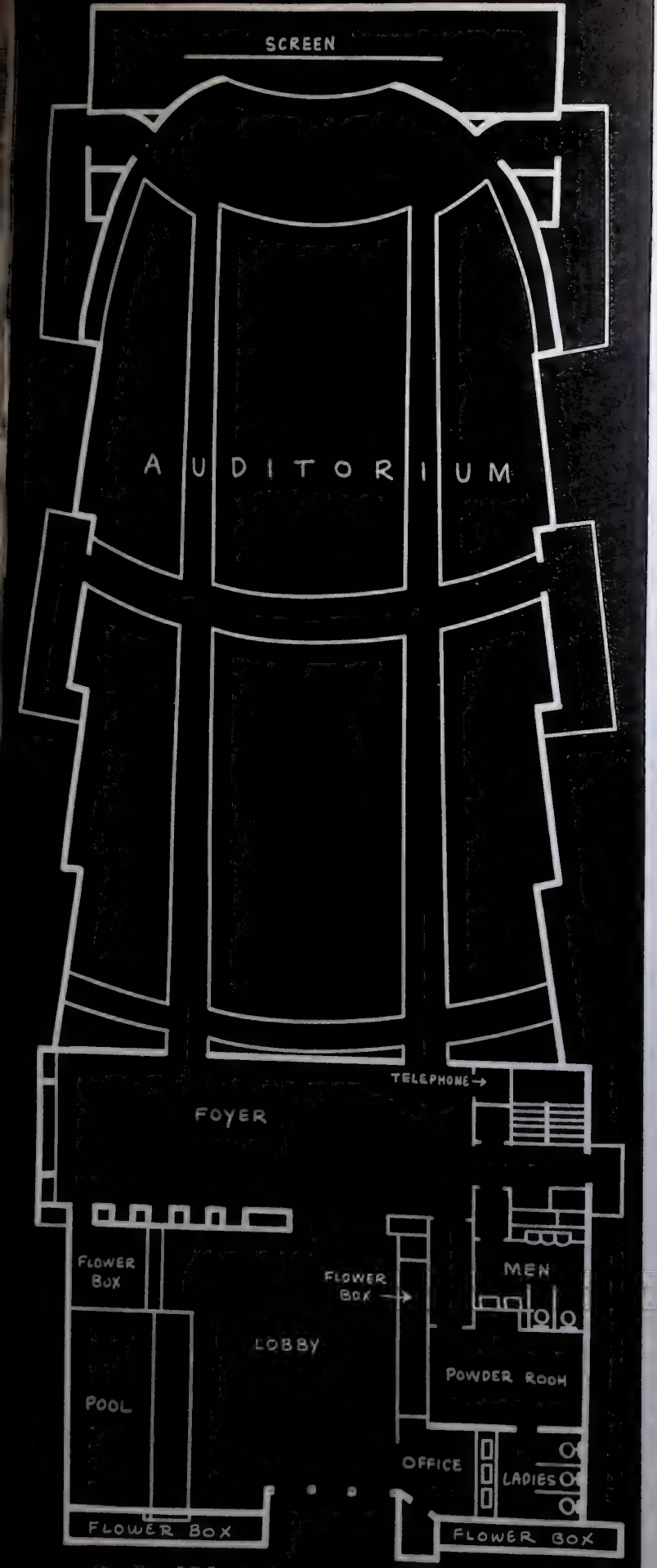


THE BOX OFFICE AT NIGHT (immediately above) presents as pleasing an appearance as it does by day (second above), both in keeping with the residential character of the locale. Bottom picture shows a corner of the pool and display frame that are seen as one leaves the theatre through the foyer. Color abounds here also.

THE AUDITORIUM of the Palms Theatre is simple, and, in addition to the 772 spaciously set seats, its only visible luxury is the dark gold-colored contour curtain and the cold-cathode, dimmer-controlled lighting which bathes the curtain and the side panels in a warm golden glow and enhances the effect of the maroon-red upholstery of the chairs. The rear portion of the walls is a rather deep blue, while a shade more on the robin's egg tone has been applied to the ceiling. Wainscoting is a shade similar to that of the walls. The stage is reduced to just an apron, yet with enough space for the desires of the management.

A CORNER OF THE LOBBY shows how the stonework and naturally finished wood have been utilized for decorative purposes, with a settee in green, a club chair in lavender, and two chairs in yellow adding to a color scheme that is literally tied together by the broad wall border of green. Furniture and carpets add more color.

THE DESIGN MOTIF of the foyer is carried out not in the traditional manner, but rather in niches along one wall. Here are shown Indian and local words of art—such as paintings, sculpture, and relics—which can be changed as desired. The walls are a deep blue-green, with a steely blue carpet and lighted ceiling.



REFERENCE CREDITS

THE PALMS THEATRE

Phoenix, Arizona

OWNER AND OPERATOR: Paramount Nace Theatres, Inc.

ARCHITECT: Lescher and Mahoney, with Pereira and Pereira as consultants.

SEATING CAPACITY: 772 persons.

COST OF BUILDING, EXCLUSIVE OF EQUIPMENT: $200,000.

COST OF EQUIPMENT, EXCLUDING AIR CONDITIONING: $40,000.

AIR CONDITIONING: Evaporative type.

CARPETS: Crestwood, by Alexander Smith and Sons Carpet Company.

CHAIRS: Push-Back, by Kroehler Manufacturing Company.

CHANGEOVERS: Brenkert, by Brenkert Light Projection Company.

COIN CHANGER: Brandt, by Brandy Automatic Cashier Company.

CURTAIN CONTROLS AND TRACK: through Premier Scenery Studios.

DISPLAY FRAMES: Custom-made.

DRAPERIES AND STAGE CURTAINS: through Premier Scenery Studios.

FILM CABINETS: Neumade, by Neumade Products Corporation.

GENERATORS: Robin-Imperial, 65/130 ampere, by J. E. Robin, Inc.

LENSES: Super Cinephor (Balcoted), by Bausch and Lomb Optical Company.

PROJECTION LAMPS: Brenkert, by Brenkert Light Projection Company.

PROJECTION MACHINES: Brenkert, by Brenkert Light Projection Company.

REWINDERS: Golde DeLuxe, by Golde Manufacturing Company.

SCREEN: RCA, through Radio Corporation of America.

SIGN: Remova-Panel, by Adler Silhouette Letter Company.

SIGN LETTERS: Third Dimension, by Adler Silhouette Letter Company.

SOUND: RCA Photophone, by Radio Corporation of America.

SUPPLY DEALERS: John P. Filbert Company and National Theatre Supply Division of National-Simplex-Bludworth, Inc.

TIMKET-ISSUING MACHINE: Automaticket, by General Register Corporation.

TICKET CHOPPER: Custom-made.

THE FLOOR PLAN of the Palms Theatre show how the various parts of the theatre, shown in the preceding three pages, are merged into a whole which at one and the same time is comfortable and home-like yet spacious enough to satisfy the damands on the 772-seat theatre. Note that manager's office sidles up to the cashier's cubicle, thus obliviating the necessity of carrying money or tickets through the public area.

In Harrington, Delaware, the Theatre's Roof Garden Promotes Good Will and Extra Revenue

THE REESE THEATRE

Many times in the smaller theatres, there is considerable space lost to constructive purposes above the second story level and in front of the high rear wall of the auditorium box. In the Reese Theatre, in Harrington, Delaware, owned and operated by Reese Harrington, ideas and talents were combined in such a way that there is utilized all that space which other theatres quite overlook.

In front elevation, the Reese Theatre is in every regard, a modern cinema, and built quite to what one might consider to be a conventional pattern for communities of a couple thousand souls. The island box office is typical of many theatres, and so are the flanking stores, a "Hollywood shop" and a snack bar.

Thus far the plan is quite orthodox, and executed in excellent symmetry. At this point it was realzied that, naturally, a considerable investment had been made and that there was an area of appreciable dimensions which was not bringing in any return for the cost of creating it. This was, of course, the space in front of the theatre's read wall, comprising actually the roof of the two-story portion of the structure up to the building line.

Since arrangements had been made for the snack bar at the sidewalk, it was decided further to utilize the services of this store, but creating a roof garden on this heretofore unused portion of a theatre. And so it was that the Reese Theatre became, so far as is known, the first cinema to have its own roof garden, a place where, of a summer's evening, the young in heart of all ages may relax in the informal atmosphere of an outdoor tea room at a resort or a sidewalk cafe.

A venture such as this can hardly fail, and it can be a potent factor in creating good will for the theatre—and profits for the management.

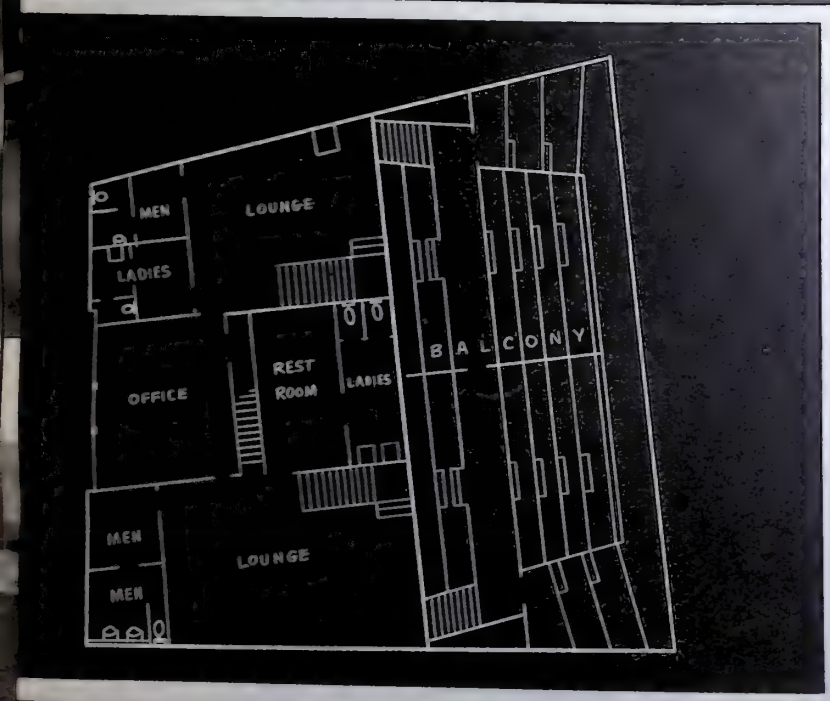
THE REESE THEATRE, which replaces a cinema of the same name destroyed by fire, is as close to a "standard" theatre as it is probably possible to get: a theatre which might be built in any business area and be architecturally at home therein: a theatre designed to be constructed economically, with all space utilized to be operated efficiently. The theatre-entrance portion is faced with light-colored Carrara-type material, while on either side only the store-front areas are so treated, the facing above the store level being of brick. A roof garden is featured in front of the rise of the auditorium. Architect was William Lynch Murray.

THE ROOF GARDEN (above) turns an otherwise non-revenue-producing area into a business venture. Created above the level of the mezzanine public rooms, and in front of the rise of the auditorium box, the area ties in with the snack bar on the street level. Thus virtually every square foot of space is turned to advantage.

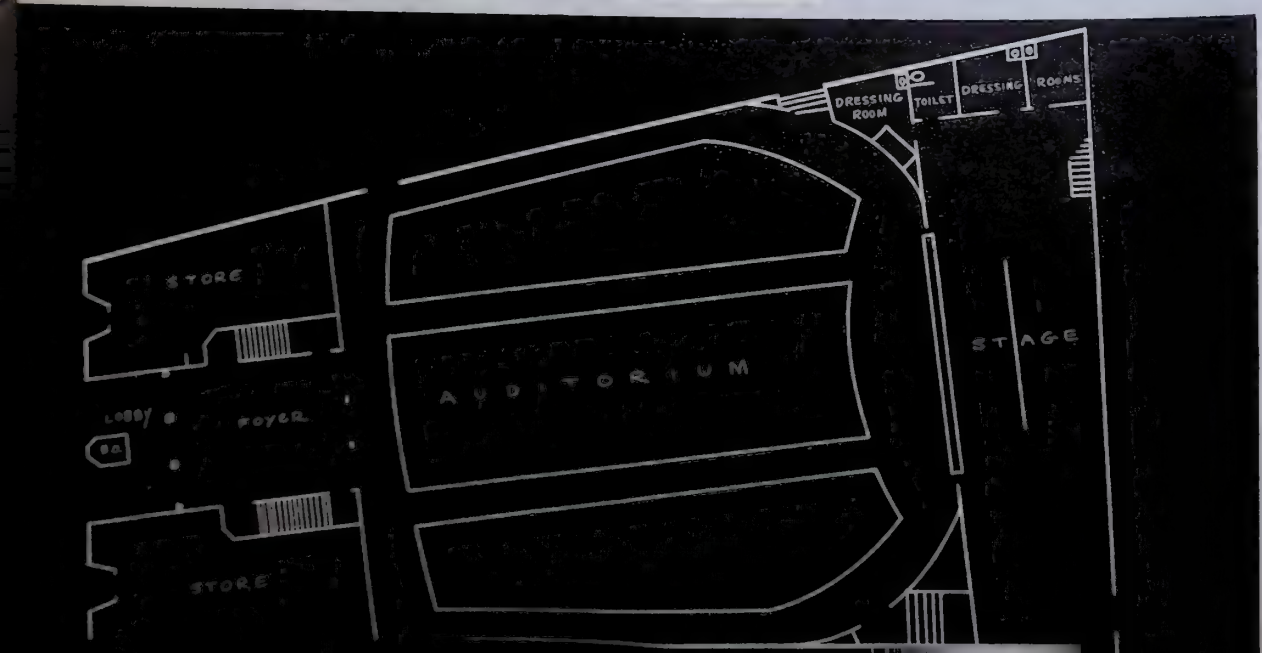
THE LOBBY of the Reese Theatre (below) continues the simplicity manifest in the front, with the principal decoration being the tile design on the floor and the longitudinal design applied to the ceiling. Lines of light-colored tile separate the foyer area into three parts for convenience at times of greatest attendance.

THE AUDITORIUM of the Reese Theatre, looking toward the screen (above), is dominated by two huge, dark-colored pillars flanking the stage with its dark valance and lighter-colored drapes and legs. The two murals, whose themes might have stemmed from mythology, add a touch in contrast to the fabric treatment.

THE REAR OF THE AUDITORIUM (below) shows the fabric treatment, which, in conjunction with the other artistic attributes, was installed by Paramount Decorating Company. Note the cry room (at the right of the picture) and the party room (at left of the picture), and also how the seating runs aside the projection booth.



THE FLOOR PLANS show the layouts of the balcony level (above), the mezzanine level (right), and the auditorium and street level (below). It should be pointed out that these drawings were prepared from an early set of plans—before the idea was conceived for creating a roof garden and before it was decided on which side of the balcony the cry room (nursery) should be placed. It is understood that the entrance to the roof garden is attained by the same stairs that lead to the projection room. It is obvious from the drawings above and to the right that this could be accomplished with little change in the design of the theatre. And, of course, it did not matter a great deal which of the two special viewing rooms should be called the nursery. It is interesting to note in this case, with a theatre of this size in a town of over some 2,100 population, that the architect should have divided the mezzanine area (left) so that not one large lounge was designed, but rather two, each with its own ladies' and men's rooms. It would appear, without having further information on the subject at hand, that a better arrangement might have been had by redesigning the area and consolidating the services, all of which could probably have been done just as economically. While the two lounges are separate, so far as the public is concerned, the manager's office can be reached from either one. The stairs between the ladies' rest room, and the manager's office lead to the projection booth and to the entrance to the theatre's roof garden. Harrington, Delaware, which this theatre serves, is in south central Kent County about 17 miles from Dover, the county seat and state capital, and is centered about a half mile west of U. S. Route 13 between Trenton and Cape Charles. Along with Seaford and Houston, Harrington is in the center of the state's tomato and sweet potato area, which agricultural pursuits occupy the time of the major portion of the town's population. Although geographically on the main north-south route, the location to the east of the town's center of the DuPont-given highway took a considerable portion of the town's traffic out of the business area. Hence, a great part of the traffic to Milford and nearby shore points no longer go through the center of Harrington. So the Reese Theatre was designed strictly to serve the population of Harrington and of Harrington alone.



Taken over by the RKO Circuit, a Remodeled Motion-Picture Theatre Opens in Minneapolis

THE RKO PAN THEATRE

The newly acquired RKO Pan Theatre in Minneapolis, that officially opened on April 20 with impressive ceremonies, remained itself the most impressive attraction of the celebration.

The extensive alterations—designed by Sebco, Inc., contractors and theatre specialists—to modernize and beautify the building both inside and out, gave the RKO Pan an entirely new marquee. Constructed by the Macey Sign Company, the streamlined marquee features the neon-lit "RKO Pan" against a background of many lamps.

The new front was finished with a facing material of carmillian granite, brought from Saint Cloud, Minnesota, and contrasted with doors, frames, and display units of massive bleached oak.

The box office was built as a part of the building.

The lobby walls are decorated in birds-eye-maple panels, finished in a light, warm stain. The lights in the ceiling have been tied together with a series of grilles suspended from the ceiling to give a lacy all-over-pattern effect. The grilles are painted in a shade of green to harmonize with the green-white-gold wall paper used on one wall of the mezzanine and the opposite wall of the lobby.

A feature was made of the popcorn and candy area, with a display on the opposite wall to match. The popcorn machine becomes part of the unit in this display, and the whole unit is set next to the inside box office, where every patron must pass. These units are very functional, created of large curved birch molding, with molding, with mirror and fabric in coral, silver, and green. The display unit, opposite the candy section, has a frame beneath the mirror which can hold either three 40x80's or one large display.

The carpet is in tan and brown, worked into a modern design which complements the rich wood atmosphere.

The foyer walls are finished in mahogany panels, divided with large milled-birch columns. Both types of wood are finished in their natural colors. The ceiling is a series of indirect light domes, lamped with amber bulbs, giving a warm, pleasant atmosphere with a minimum amount of light bleeding into the auditorium. One wall in the foyer is painted a light yellow-green, with a large all-over pattern in brown, white, and gold.

The auditorium was decorated in two colors of magenta and off-white. All new lighting fixtures were installed in the auditorium.

The latest high-intensity projection assures visual comfort. And the full benefit of the latest model sound equipment is assured by the use of a special acoustical plaster on the walls.

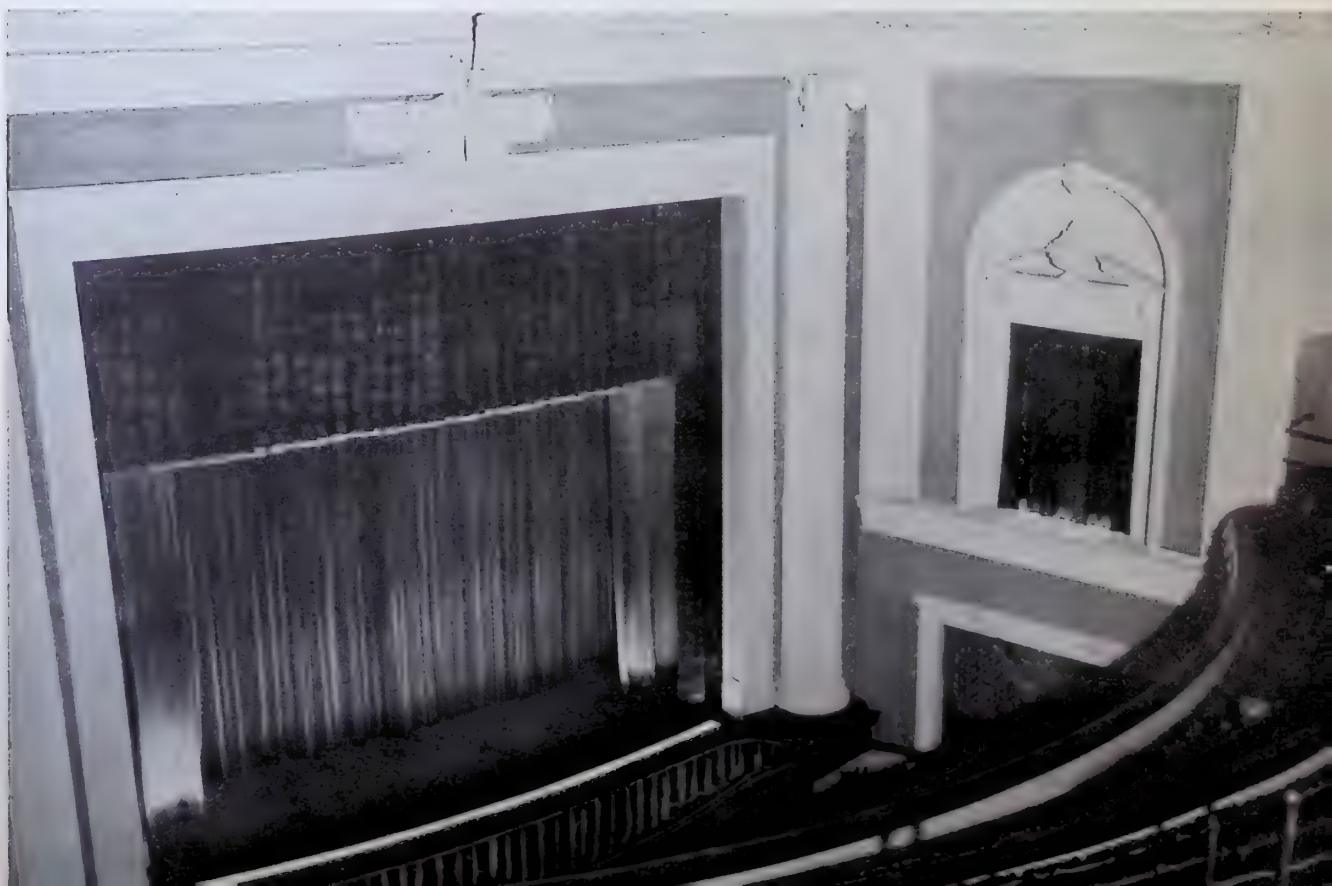
Furnishings in the lounge and mezzanine accent the modern.

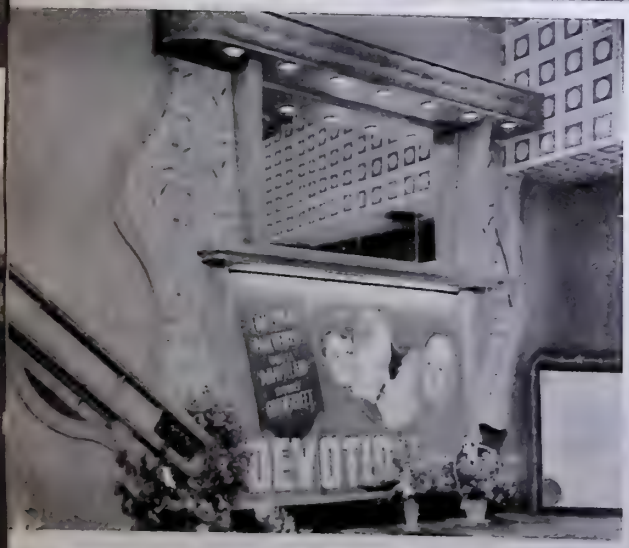
THE ANIMATION OF THE SIGN, constructed by the Macey Sign Company, is unusual in that, as the lamps on the front of the marquee light up, starting from the top and traveling down, the neon "RKO" is thrown into silhouette and then the neon "Pan" is thrown into silhouette. When the lamps go out, starting from the bottom and traveling up, the neon "Pan" lights up, and then the neon "RKO" lights up. Behind the "RKO Pan" on the sides of the marquee is indirect lighting, and, as the lamps framing the sides of the marquee go on, the "RKO Pan" is thrown into silhouette, and the indirect lighting makes for an unusual effect.

THE LOBBY, looking toward the mezzanine level, reveals the lobby walls of birds-eye-maple panel, finished in a light, warm stain. The lights of the ceiling have been tied together with a series of grilles which have been painted a green to match the verdant hue of the tri-colored wall paper that is noted on the far mezzanine wall.

THE STREAMLINED LOUNGE of the RKO Pan Theatre is highlighted with modern furniture, finished fabrics of gay colors and patterns. The light, solid-colored walls, with dark, contrastingly colored molding, complements the tan and brown carpeting. The men's room is at the other end of the spacious, comfortable lounge.

THE AUDITORIUM of the RKO Pan Theatre, whether seen from the stage (above) or from the balcony (bottom), reveals a pleasing blend of Colonial design, Neo-Classicism, and modern simplicity, an over-all effect that is even enhanced in real life by the magenta and off-white of the color scheme. Considerable new equipment was installed to take full advantage of the high-intensity projection, and, that the patron might be beneficiary of the best in sound, a special acoustical plaster was applied to the auditorium walls. All new lighting fixtures were installed in the auditorium, better to utilize light in the over-all decorative scheme.





STRATEGICALLY LOCATED—beside the inner box office and near the foot of the mezzanine stairs—is the popcorn machine and the candy counter, making it impossible for one to enter the theatre without becoming very much aware of the refreshment snacks offered for sale. In the picture above will be seen the details of the architectural and decorative arrangement, a feature which, in toto, is repeated as the setting for a display unit on the opposite wall (picture to the left.) The functional characteristic of these areas is achieved through the use of large curved birch molding, mirrors, and fabrics in coral, green, and silver.

THE FOYER WALLS (bottom left picture) of the newly redecorated RKO Pan Theatre are finished in a mahogany panel divided with large milled birch columns. Both types of wood are finished in their natural colors. The ceiling is a series of circular indirect light domes, lamped with amber bulbs, giving a warm pleasant atmosphere with a minimum amount of light bleeding into the auditorium. One wall of the foyer is painted with a light yellow-green, with a large over-all pattern in brown, white, and gold. The carpet is in shades of tan and brown, worked into a sort of inlaid-type of modern pattern, with the whole nicely blending together.

THE MEZZANINE of the RKO Pan Theatre (bottom right picture) features modern furniture in gay and solid colors which harmonize with the modernly designed brown and tan carpet. One mezzanine wall is covered with green, white, and gold wall paper, which is also used on the opposite wall of the lobby. The lobby is done in birds-eye-maple paneling, finished in a light, warm stain. The lobby ceiling lighting, which can be noted from this pictured area, has been tied together with a series of grilles suspended from the ceiling, to give a lacy all-over-pattern effect. The grilles have been painted a shade of green to match the wall paper.

A New Strand Replaces the Old Strand in Brockport, New York, for the Kallet Circuit

THE STRAND THEATRE

Kallet Theatres, Inc., has spared no pains nor expense in giving Brockport, New York, the best to be had. A little bit of Broadway brought to the city of 3,600 population aptly characterizes the new Strand Theatre that opened in an enlarged and improved motion-picture house that proved to be a surprise to the opening-night audience.

The transformation accomplished by the Kallet Theatres, Inc., in three short months is so complete that one, once within the foyer, can readily imagine he is in Buffalo, Rochester, or some other large city. In fact, it is not necessary to enter the theatre to obtain this impression: the marquee, visible the entire length of the Brockport business section, with its myriad of twinkling lights, is no less brilliant than similar marquees along the Gay White Way in Little Old New York.

When Myron J. Kallet, head of the organization bearing his name, announced that the company was going to enlarge and modernize the Strand Theatre, he stated that, in his judgment, Brockport merited the best in a picture theatre and that he proposed to bring that desideratum to pass. Approximately $100,000 was spent on the project, and the verdict of the public was that Kallet had quite made good his promise.

Entrance to and exit from the theatre is by four sets of solid glass doors. The front and sides are covered with red glass. The scalene marquee is surmounted by two name signs composed of individual capital and small letters.

At the north corner of the property is a candy store with a facade finished in blue glass. The store also opens onto the foyer area of the theatre, so that the theatre's cash customers may also be served with candy and ice cream through the same facilities. However, the placement of the bar, being, for the incoming patron, across the line of outgoing customers, might result in an occasional reduction of sales, especially when the incomer enters at the time of a heavy break.

Off the foyer area are located the modern ladies' and men's lounges.

Highlight of the steel-brick-concrete, fire-proof theatre is the enlargement of the capacity by some 200 seats. All seats—upholstered in maroon plush, with padded backs—are on one floor and arranged to permit the best view of the screen.

The while new projection and speaker equipment was installed, the sound system of the old theatre was re-established.

Instead of the low ceiling, which caused a stuffiness in the old house, the ceiling of the new theatre is two stories high, and the theatre, from the solid glass doors at the front to the most remote back corner, is completely air conditioned by machinery of latest design.

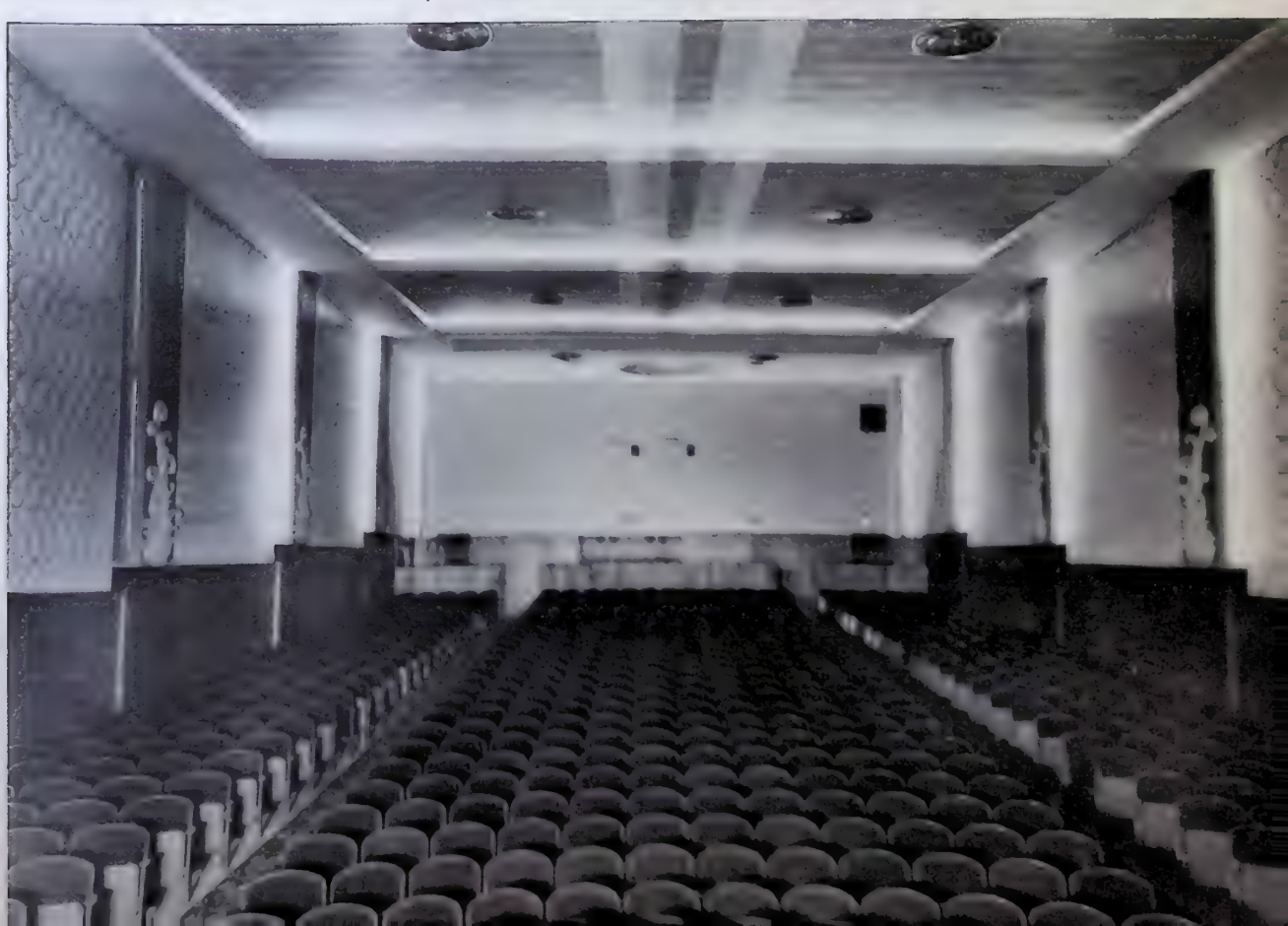
THE STRAND THEATRE, Brockport, New York, was designed by Michael J. DeAngelis to take advantage of some of the structural glass items of the Pittsburgh Plate Glass Company. In the first place, entrance to the theatre lobby is by four sets of double glass doors. Below the marquee, and around the corner, the facing material is red glass, and above the marquee level the facing material is of a similar nature in contrasting color. The facade of that portion dominated by the show window of the candy store, the facing material is blue glass. A further novelty is the use of a capital and five small letters to spell out the theatre name

THE LOBBY of the Strand Theatre is dominated on the left, as one comes through the entrance doors, by the candy counter that is, in fact, part of the store at the north corner of the theatre building. However, this particular placement—requiring the incoming patron to cross the outgoing flow of traffic—is not looked on with most favor. From the floor plan, it would seem that it might have been possible to locate the candy store on the opposite corner—which would have had the added advantage of causing the store to face two streets. Opposite side of the foyer is shown below in the picture at the left side of page.

LOOKING FROM THE STANDEE AREA INTO THE LOBBY, the normal position for the doorman is seen, as well as the modern tubular furniture used to embellish the area. The floor covering is a deep-pile carpet, in tones of red, yellow, and green. The men's and ladies' lounges back up to the opposite sides of the foyer space.

DETAILS OF THE MURAL DECORATION is shown here, with the plaque adorning the base of the dark-color column-like treatment of the wall and the painted mural as a portion of the all-over proscenium treatment. The mural seems to have no particular significance, except to take away the bareness of the dark-colored area.

THE AUDITORIUM of the Strand Theatre takes advantage of fabric for the principal wall decoration, with a mural effect to point up the darker fore portion of the decorative scheme. The ceiling takes further advantage of the natural shape of the Celotex acoustical treatment in the colorful decorative plan. Wainscot is wood-like. In the picture below is better seen the way of utilizing cove lighting in the stage face of the serrations of both side walls and the ceiling. The darker column effects, behind the front edge of which the lighting is set, are decorated with special mural plaques. The lighting in the auditorium is of the cold-cathode type.



REFERENCE CREDITS

THE STRAND THEATRE

Brockport, New York

OWNER AND OPERATOR: Kallet Theatres, Inc.

ARCHITECT: Michael J. DeAngelis.

DECORATOR: Belgian Art Studios.

SEATING CAPACITY: 750 persons.

COST OF BUILDING (EXCLUSIVE OF EQUIPMENT): $100,000.

COST OF EQUIPMENT (INCLUDING AIR CONDITIONING): $30,000.

ACOUSTICAL MATERIAL: Celotex, by Celotex Corporation.

AIR CONDITIONING: by General Electric Company.

CARPETS: through McBride Upholstering Company.

CHAIRS: by Heywood-Wakefield Company.

CHANGEOVERS: Thide, by Dowser Manufacturing Company.

DRAPERIES AND STAGE CURTAINS: Belgian Art Studios.

FILM CABINETS: Neumade, by Neumade Products Corporation.

GENERATORS: Transverter, by Hertner Electric Company.

PROJECTION LAMPS: Simplex High, through National Theatre Supply.

PROJECTION MACHINES: Super Simplex, by International Projector Corporation.

SCREEN: Walker PM, by Walker American Corporation.

SIGN AND MARQUEE: by Flexlume Corporation.

SIGN LETTERS: Third Dimension letters on Remova-Panel frames, by Adler Silhouette Letter Company.

SUPPLY DEALER: National Theatre Supply Division of National-Simplex-Bludworth, Inc.

TICKET-ISSUING MACHINE: Automaticket, by General Register Corporation.

TICKET CHOPPER: Golde, by Golde Manufacturing Company.

WALL FABRICS: Fiberglas, by Owens-Corning Fiberglas Corporation.

THE PLANS of the Strand Theatre shows the arrangement of the lobby, foyer, and standee space, and how the ladies' lounge leads off one end of the standee area and the men's room off the other end. Note particularly the placement of the candy store, which can be designed on the inside so that the counter on the foyer side can be served efficiently without interfering with the operation of the store as an independent commercial establishment. The location most designers prefer, however, is one which must be passed in the natural flow of traffic as the patrons enter the theatre on their way to seats, without crossing traffic lines.

A Warner Theatre Rises from the Ashes of a Fire-Destroyed Cinema in Fairmont, West Virginia

THE FAIRMONT THEATRE

After nearly a quarter of a century, during which time many of the country's great trod its boards, fire brought an end to the Fairmont Theatre in Fairmont, West Virginia, nearly two years ago. Despite shortages of all kinds—and all the other vicissitudes of wartime construction—but eighteen months was required to bring into being a new and even greater Fairmont Theatre.

Designed by Victor A. Rigaumont and built by the Novarro Corporation for Warner Brothers Theatres, Inc., of West Virginia, the Fairmont Theatre presents a number of interesting features.

Only two theatres—New York's Metropolitan and London's Warner—have the type of sunken ceiling lighting installed in the Fairmont.

All woodwork in the theatre, even down to the display frames, is of solid walnut, beautifully grained.

The beautifully designed tapestry, made especially for the Fairmont, covers the acoustically treated walls which are, in turn, covered by blocks of rock wool.

The candy stand, with its space and storage facilities, has been designed as an integral part of the theatre.

The marquee and display sign was designed as a regular part of the theatre, serving the dual purpose of decoration and advertising. More than 1,200 bulbs and several hundred feet of neon tubing serve the illumination.

The wide, graduated stairways are designed for safety and to eliminate the customary illusion of height.

The use of soft, pastel decorations was the source of the tone effect in blending colors of the mural effects.

With hundreds of square feet of carpet flowing to all parts of the theatre, the color and weave offered a problem, solved by the use of a soft pastel shading of the color selection and by the use of carpeting similar to that of New York's Radio City Music Hall.

The lounge rooms are nicely appointed and decorated.

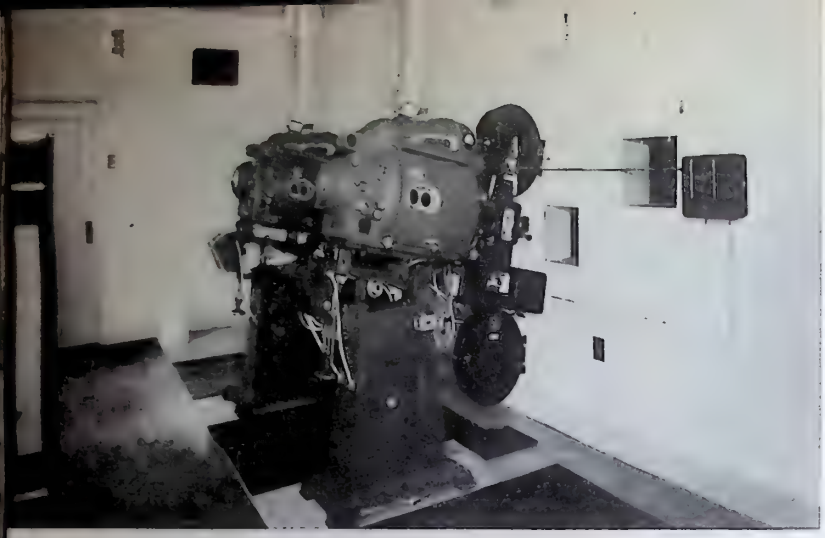
The ventilation system assures a complete change of air every three and a half minutes. The air-conditioning system will effect cooling during the summer and, in the winter, also serve to condition the auditorium air.

As the theatre opened, the operation policy was as a first-run A house, with a top adult price of 55 cents, including tax. New pictures (on a single-feature basis) open on Sunday, Wednesday, and Friday.

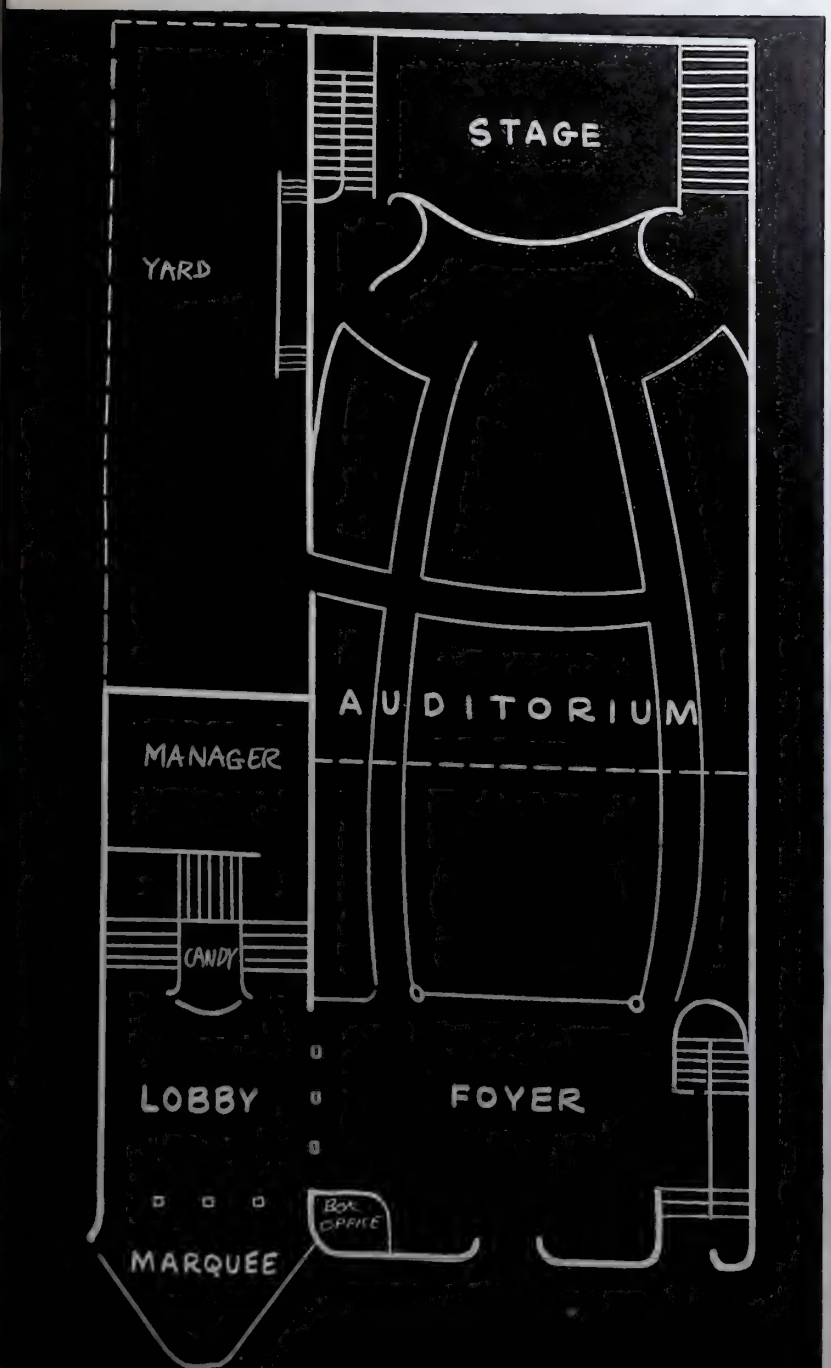
Design of the Fairmont Theatre is copyright 1945 by Victor A. Rigaumont.

THE FAIRMONT THEATRE is of fire-proof construction, of brick, steel, concrete, structural glass, and chrome. The facade, below the level of the soffit, is faced tan Carrara glass with chrome trim. Above this level, facing material is cream brick. The sign and marquee were constructed by the Philadelphia Sign Company.

Ten-inch letters are used on the announcement board. In the box office will be found a three-unit Automaticket, manufactured by General Register Corporation. The decoration of the lobby and foyer are hand-done, by the artists of Rambusch. The theatre, costing about $500,000, replaces the old fire-destroyed Fairmont.



THE PROJECTION ROOM is equipped with the latest models of the apparatus adapted to a theatre of these proportions. From behind the screen, multicellular speakers are used to send forth the words and music.



REFERENCE CREDITS

THE FAIRMONT THEATRE

Fairmont, West Virginia

OWNER AND OPERATOR: Warner Brothers Theatres, Inc.

ARCHITECT: Victor A. Rigaumont.

DECORATOR: Rambusch Decorating Company.

SEATING CAPACITY: 1,568 persons.

COST OF BUILDING (EXCLUSIVE OF EQUIPMENT): $500,000.

COST OF EQUIPMENT (EXCLUSIVE OF AIR CONDITIONING): $50,000.

GENERAL CONTRACTOR: Navarro Corporation.

BUILDERS SUPPLIES: May Brothers.

ELECTRICAL CONTRACTORS: Frame Electric Company.

GLASS CONTRACTOR: Allied Paint and Glass.

HEATING EQUIPMENT: Trane Company.

PLASTERING CONTRACTOR: S. M. Kisner and Sons.

STEEL WORK: Keystone Engineering Company.

WRECKING CONTRACTOR: General Wrecking Company.

ACOUSTICAL MATERIAL: Rock wool, through Charles H. Kenney Studios.

AIR CONDITIONING: York-Freon, by York Corporation; installed by Stuart McMunn Company.

CARPETS: Crestwood, by Alexander Smith and Sons Carpet Company, installed by Gustav Dax, contractor.

CHAIRS: Ideal, by Ideal Seating Company.

DISPLAY FRAMES: Sealuxe, by Universal Corporation; and by Lobby Display Company.

DRAPERIES AND STAGE SETTINGS: by Charles H. Kenney Studios.

LENSES: Super Cinephor (Balcoted), by Bausch and Lomb Optical Company.

LIGHTING FIXTURES: through Rambusch Decorating Company.

PROJECTION LAMPS: Ashcraft DeLuxe, by C. S. Ashcraft Manufacturing Company.

PROJECTION MACHINES: Super Simplex, by International Projector Corporation.

SAFETY CONTROLS: by Sentry Safety Controls.

SIGN AND MARQUEE: by Philadelphia Sign Company.

SOUND: RCA Photophone, by Radio Corporation of America; with multicellular speaker system.

SUPPLY DEALER: National Theatre Supply Division of National-Simplex-Bludworth, Inc.

TICKET-ISSUING MACHINE: Automaticket, by General Register Corporation.

VENDING MACHINES: through Berlo Vending Company.

WALL FABRICS: Damask, through Charles H. Kenney Studios.

THE FLOOR PLAN shows to particular advantage the location of the candy stand, which, while in the line of vision at time of entrance, requires the crossing of the flow of outgoing traffic to be patronized.

THE AUDITORIUM (above) of the Fairmont Theatre, with its balcony, has 1,500 seats. In the Fairmont, the architecture is conceived to provide an appropriate setting for the full enjoyment of motion pictures projected with all the clarity modern science has made possible. The viewer is unaware of surrounding during screening.

THE CANDY STAND (below), across the lobby from the entrance doors, was conceived as an integral part of the theatre and installed by Berlo Vending Company. Storage space for candy stocks is also provided. Facing the stand, to the right are the stairs leading to the balcony, and, at the right, the stairs leading to the lounge.

Working around the Clock, a Remodeling Is Completed in 12 Days at Meadville, Pennsylvania

THE PARK THEATRE

A specially trained crew of men, working 24 hours a day, gave in 12 short days the 19,000 population of Meadville, Pennsylvania, a "brand new" theatre, completely repainted, remodeled, and refitted from box office to stage.

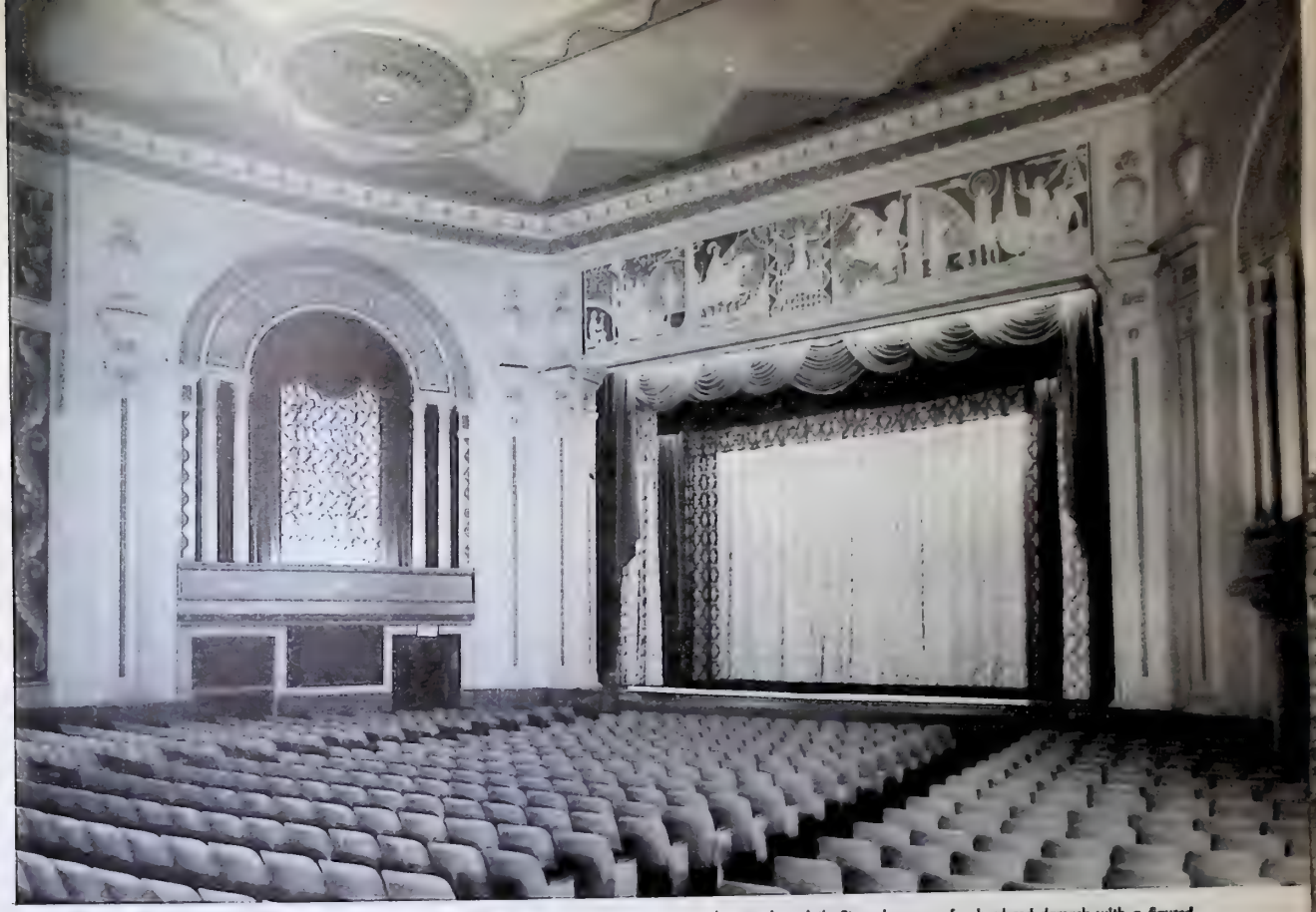
Twelve murals and 32 smaller panels, all the work of William A. Karuso, the Hungary-born, U.S.-trained artist, comprise the chief decorative interest. A great "Mural of the Ages" above the stage reviews the ancient times, through the Middle Ages, up to the present day, and finally the world of tomorrow, with the whole composition held together by a symbolic feminine figure.

The entrance lobby ceiling has signs of the zodiac and their symbols, with the sun in the center held by four figures which represent the four seasons, a child representing spring, a female figure for summer, a young man for autumn, and an old man for winter, with all surrounded by a representation of the Galactic Way. The inner lobby is decorated in a modernistic flower pattern.

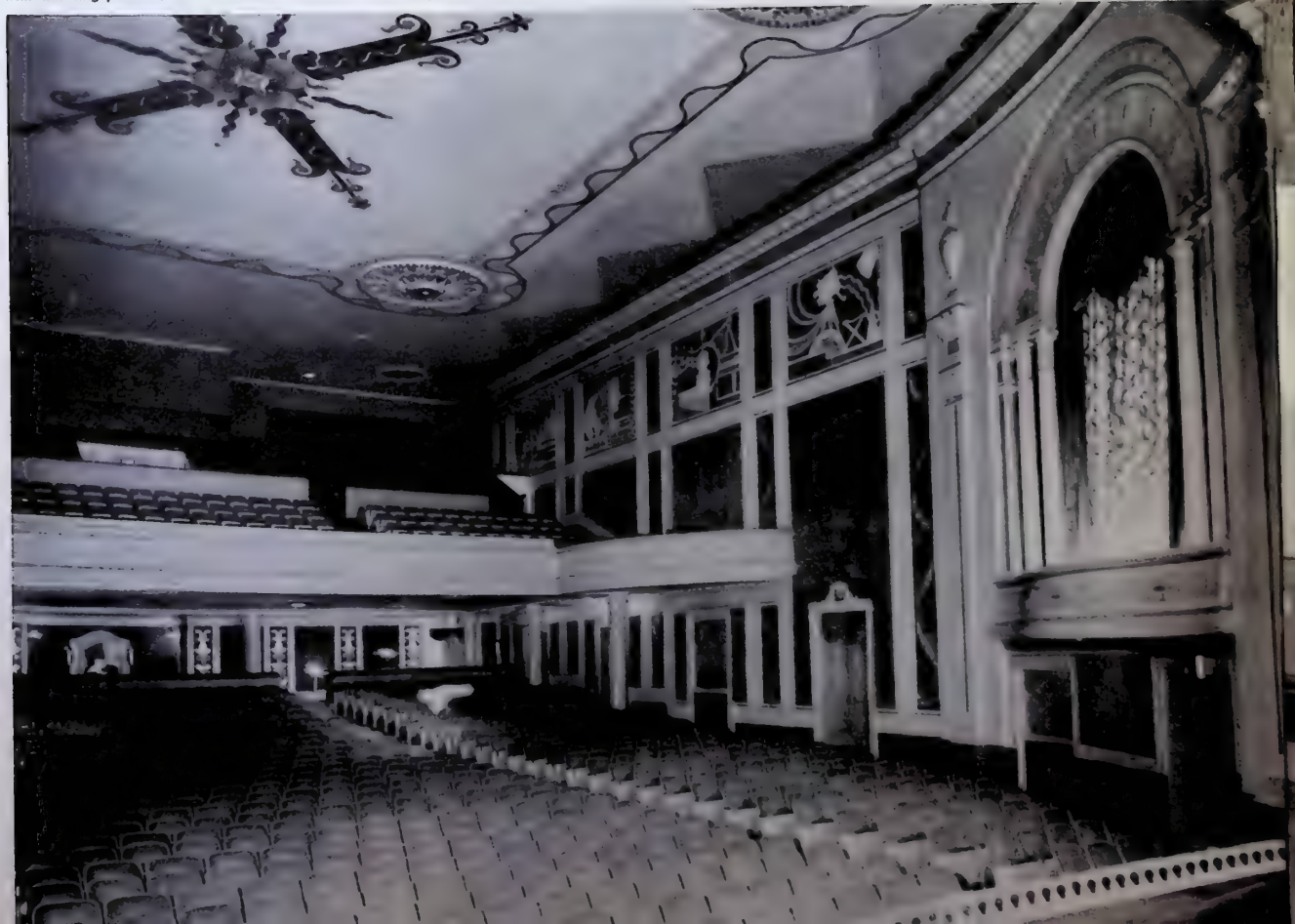
The building is, inside and out, completely fire-proof. Using all eight exits, it is estimated that the theatre can be emptied in 90 seconds.

Plans and designs of the Park Theatre are copyrighted by Victor A. Rigaumont, the architect, who reserves all rights.

THE PARK THEATRE, Meadville, Pennsylvania, came into being in 1922, the tenth of a series of auditoriums dating from 1899. And it was at the Park, in 1929, that Meadville's theatres developed vocal chords with the showing of "Show Boat." The paneled marquee employs translucent plastic letters set on window-type frames with opal glass. A fluorescent orange neon tube borders each extremity of the three-sided marquee, which will also accommodate life-size colored photographic transparencies. Letters and background provide a third dimensional effect during the day, which is not wholly lacking when seen through a blinding snowstorm.



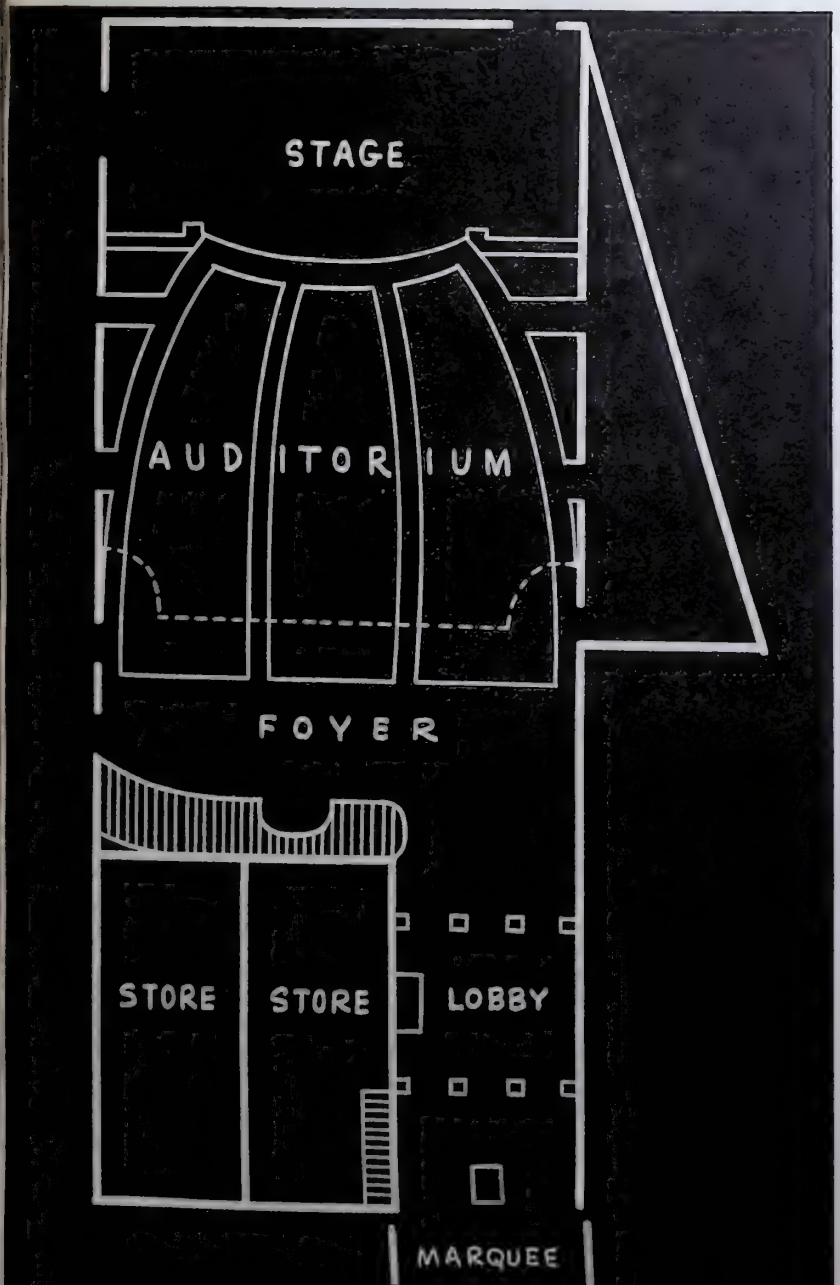
THE AUDITORIUM has its side walls lined with red corduroy velour, matching the seating upholstery. The exit doors are festooned with a valance. The proscenium, circle, and box arches are hung with red, gold, and green velour swag drapes, with matching panels on the auditorium side. The front stage curtain is a printed green and gray glass cloth. Stage legs are of a bordered damask with a figured design in glass cloth. Another draw curtain is of green and gray glass cloth. The ceiling of the balcony is a robin's egg blue, while that of the main auditorium is a multicolored, modernistic blending of gray, gold, and blue. Lighting is indirect.



THE OUTSIDE-INSIDE LOBBY is reached through six pairs of solid doors. Draped acoustical tile is used along the foyer back wall to the entrance and around the doors facing the lobby. Drapes are used in the inner lobby and around doors and walls. All walls were padded before the drapes are hung, to absorb outside noises.

IN THE MEZZANINE the color scheme is an orange and lemon yellow, with blue borders and decorative panels. An emergency auxiliary lighting system can be brought into use in case of power failures, employing a gasoline engine in lieu of the regular generators. Rock wool is used as the insulation against heat and cold.

THE FLOOR PLAN of the Park Theatre reveals, to some extent, a form to be expected with a 1922-built theatre, when the influence of the legitimate theatre was still strong on the up-and coming cinema. The size of the stage definitely dates the basic physical structure, as does the general shape of the seating plan. Acoustically, however, the theatre is strictly for sound pictures. The candy stand is, unfortunately on the exit lane of the lobby.



REFERENCE CREDITS

PARK THEATRE

Meadville, Pennsylvania

OWNER AND OPERATOR: Meadville Park Theatre Corporation, Dr. Harry C. Wislow, president, and L. M. Conrad, managing director.

ARCHITECT: Victor A. Rigaumont.

DECORATOR: Garbo Decorating Company, with William A. Karuso, mural artist.

SEATING CAPACITY: 1,505 persons.

COST OF BUILDING (EXCLUSIVE OF EQUIPMENT): $75,000.

GENERAL CONTRACTOR: Navarro Corporation.

CARPETING INSTALLATION: Gustav Dax.

ELECTRICAL CONTRACTOR: Frame Electric Company.

CARPETS: Crestwood, by Alexander Smith and Sons Carpet Company.

CHAIRS: Bodiform, by American Seating Company.

CHANGEOVERS: Strong Zipper, by Essannay Electric Manufacturing Company.

CURTAIN CONTROLS AND TRACK: through Charles H. Kenney Studios, Inc.

DISPLAY FRAMES: Sealuxe, by Universal Corporation.

DRAPERIES AND STAGE SETTINGS: through Charles H. Kenney Studios, Inc.

FILM CABINETS: Neumade, by Neumade Products Corporation.

GENERATORS: Transverters, by Hertner Electric Company.

LENSES: Snaplite Series II, by Kollmorgen Optical Corporation.

LIGHTING FIXTURES: Downlights, by Rambusch.

PROJECTION LAMPS: Peerless Magnarc, by J. E. McAuley Manufacturing Company.

PROJECTION MACHINES: Simplex E-7, by International Projector Corporation.

REWINDERS: Golde, by Golde Manufacturing Corporation.

RUBBER MATS: by O. W. Jackson and Company, Inc.

SCREEN: Retiscope, by Retiscope Screen Company.

SIGN AND MARQUEE: Flexlume Sign Company.

SOUND: RCA Photophone, by Radio Corporation of America.

SUPPLY DEALER: National Theatre Supply Division of National-Simplex-Bludworth, Inc.

WALL FABRICS: Fibrous glass, through Charles H. Kenney Studios, Inc.

A New Stadium-Type Theatre in Little Rock, Arkansas, Serves Both White and Colored Patrons

THE NABOR THEATRE

To serve a middle-class working population of about 7,500, the Kirby Theatre Corporation—synonymous with Sam B. and Marie O. Kirby—has opened a theatre which, by its very name, is dedicated to the service of one of the neighborhoods of Little Rock, Arkansas.

The Nabor Theatre, in its construction, has utilized a variety of materials, including brick, tile, and concrete, with steel and masonry walls, well-span trusses, and a metal roof deck, and some utilization of stainless steel and glass bricks. A compactness has been effected to facilitate maximum comfort with a minimum number of employes.

Facade of the Nabor Theatre is a concrete plaster laid over brick, with a cream ground color set off by bands of forest green and burnt orange. Stainless steel and glass blocks comprise the architectural decoration. The glass blocks in the box office and the store are back-lighted with fluorescent colored lights. Neon and fluorescent lighting is also used on and underneath the marquee. The lobby frames and hardware is of dull aluminum.

The outer lobby is done in shades of green, with maroon and silver trim, with the foyer finished green, with trim of burgundy, orange, and silver. The indirect lighting overhead is from neon tubes set in a circular cove, and small circles on the side walls with mirrors illuminated by indirect neon.

The ceiling of the auditorium is finished in Acousti-Celotex board, with reflected plaster ceiling from the proscenium. The plaster walls are splayed for acoustical purposes, with a band of Acousti-Celotex the dado. All doors are of natural wood finish. The auditorium color scheme varies from sand to dark beige on the walls, with orange, green, and silver embellishments.

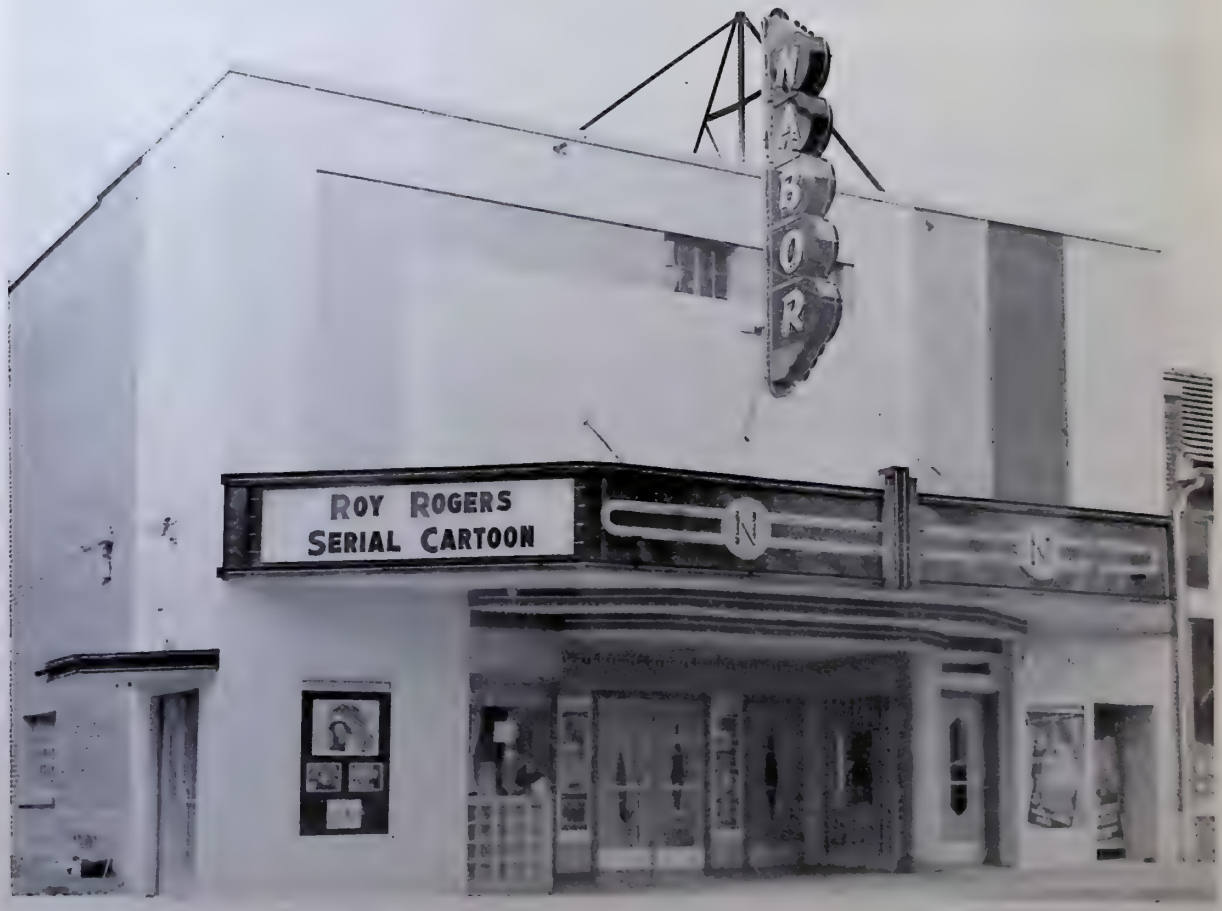
All the toilet rooms have tile floors and dado, with smooth, decorative plaster walls.

The stadium-type balcony is for colored patrons. While a single box office serves both white and colored patrons, the latter use a side entrance with its own vestibule. The rest rooms for colored are located to the left of the projection booth.

The one store in the structure has been leased as a beauty shop.

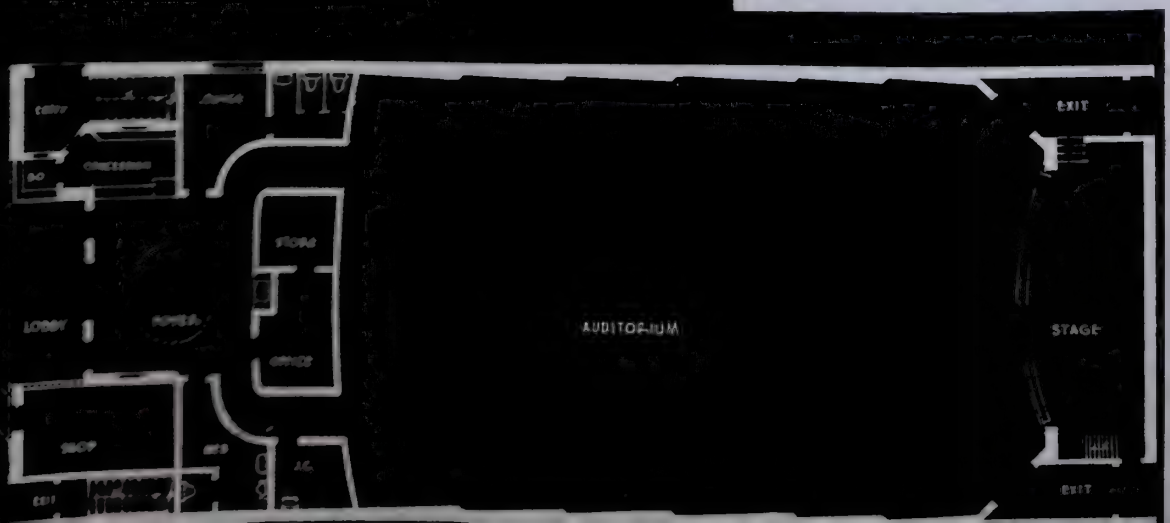
As the theatre opened, the policy was to operate with single features Sunday through Thursday, with double bills on Friday and Saturday. For these programs the top prices were 30 cents for adults and 14 cents for children.

THE NABOR THEATRE, as the name suggests, is 600-seat sub-run cinema serving an estimated 7,500 population composed largely of the great middle (working) class. The theatre is constructed of brick, tile, concrete, and steel. The facade is of concrete plaster laid over brick base, sand finished, and painted to a cream with bands of forest green and burnt orange. Stainless steel and glass blocks feature the architectural trim, with the lobby frames and hardware finished in dull aluminum. The glass blocks are illuminated with colored fluorescent lights. All doors are natural finish. Fluorescent lighting is used in and under the marquee.



THE CONCESSION SPACE is a recessed area at the left of the foyer where there have been installed a Columbia candy case and a popcorn machine made by the Star Manufacturing Company, Inc. while the plan indicates a sales window for serving side-entrance seats, it would seem from the picture that a change in plan had been effected, as the door appears to be that for the box office. One attendant can serve both candy and popcorn.

THE FLOOR PLANS indicate a consistency of design to facilitate maximum patron comfort with a minimum of employes. The stadium-type balcony is not reserved patrons and accupies space above the office, foyer, and main-floor rest rooms. One box office serves both groups of patrons. The colored use a side entrance, with its own vestibule. The colored rest rooms are to the left of the projection room. The first-floor store has been leased.



REFERENCE CREDITS

THE NABOR THEATRE

Little Rock, Arkansas

OWNER: Kirby Theatre Corporation.

OPERATOR: Sam B. and Marie O. Kirby.

ARCHITECT: Brueggman, Swaim, and Allen.

DECORATOR: Cole Brothers.

SEATING CAPACITY: 600 seats.

COST OF BUILDING (EXCLUSIVE OF AIR CONDITIONING): $50,000.

COST OF EQUIPMENT (INCLUDING AIR CONDITIONING): $20,000.

ACOUSTICAL MATERIAL: Acousti-Celotex, by Celotex Corporation.

AIR CONDITIONING: Governaire, 30-ton, Governaire Corporation.

CARPETS: Crestwood, by Alexander Smith and Sons Carpet Company.

CHAIRS: Bodiform, by American Seating Company.

CHANGEOVERS: Thide, by Dowser Manufacturing Company.

COIN CHANGERS: Brandt, by Brandt Automatic Cashier Company.

CURTAIN CONTROLS AND TRACK: Vallen, by Vallen, Inc.

DISPLAY FRAMES: Sealuxe, by Universal Corporation.

DRAPERIES AND STAGE CURTAINS: through Premiere Studios.

FILM CABINETS: Neumade, by Neumade Products Corporation.

LENSES: Cinephor, by Bausch and Lomb Optical Company.

PROJECTION LAMPS: Simplex High, through National Theatre Supply.

PROJECTION MACHINES: Super Simplex, by International Projector Corporation.

RECTIFIERS: National, through National Theatre Supply.

REWINDERS: Golde, automatic, by Golde Manufacturing Company; and Neumade, hand, by Neumade Products Corporation.

SCREEN: Walker PM, by Walker American Corporation.

SIGN AND MARQUEE: Arkansas Sign and Neon Company.

SIGN LETTERS: Custom-made.

SOUND: Simplex Four Star, by International Projector Corporation.

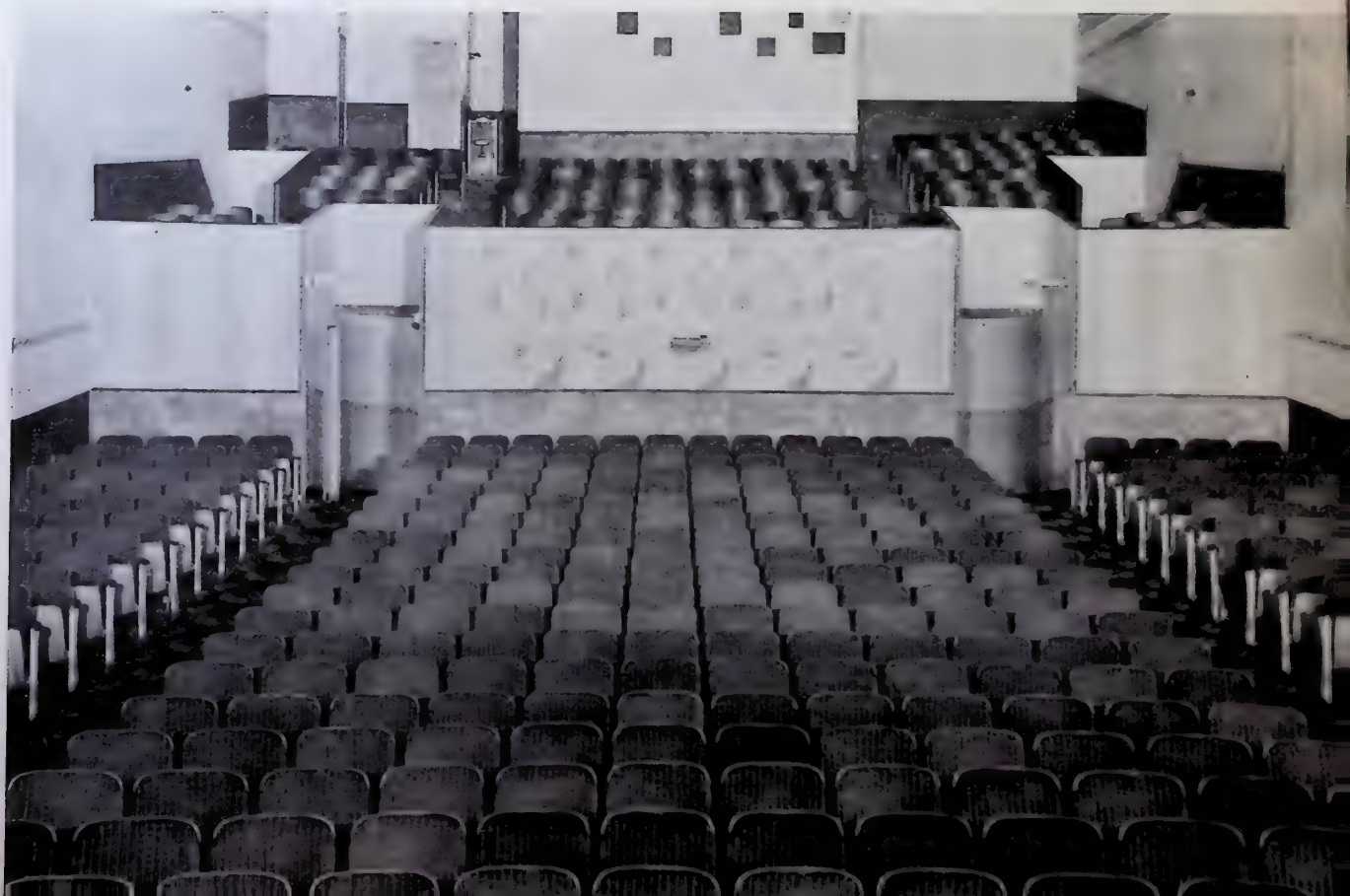
SUPPLY DEALER: National Theatre Supply Division of National-Simplex-Bludworth, Inc.

TICKET-ISSUING MACHINE: Automaticket, by General Register Corporation.

TICKET CHOPPER: Golde, by Golde Manufacturing Company.

VENDING MACHINES: Candy, through Columbia; popcorn, by Star Manufacturing Company, Inc.

THE AUDITORIUM of the Nabor Theatre possesses a ceiling treated with Acousti-Celotex board. The walls are plastered, splayed for acoustic purposes, with a band of Acousti-Celotex at the dado. The decorative scheme include colors from sand to dark beige on the walls, with accenting embellishments in green, orange, and silver. The stadium section (below) is exclusively for colored people who, after purchasing tickets at the theatre's single box office, enter the cinema at the side of the building and climb a short flight of steps to this part of the theatre. Toilet facilities for the stadium customers are at the left of the projection booth.



A $265,000, 940-Seat Theatre, in Modern Colonial Design, Comes to Alexandria, Virginia

THE CENTRE THEATRE

THE CENTRE THEATRE, Alexandria, Virginia, is designed to transcribe in modern terms the Colonial tradition for which the Old Dominion is famous in song and story, as well as to carry out the same general theme of the community it serves. Here, too, is an example of planning with the future in mind, for, while two stores are included, the plans show two more on the far side—and the near side shows possibilities for building even more.

Chief characteristic of the recent cinemas built and opened under the aegis of Neighborhood Theatre, Inc., whose Richmond headquarters is the heart of a network of more than 30 theatres, is the Colonial theme, emblematic of the Old Dominion it serves. Latest additions to this largest of Virginia's circuits are the Centre Theatre in Alexandria and the Glebe Theatre in Arlington.

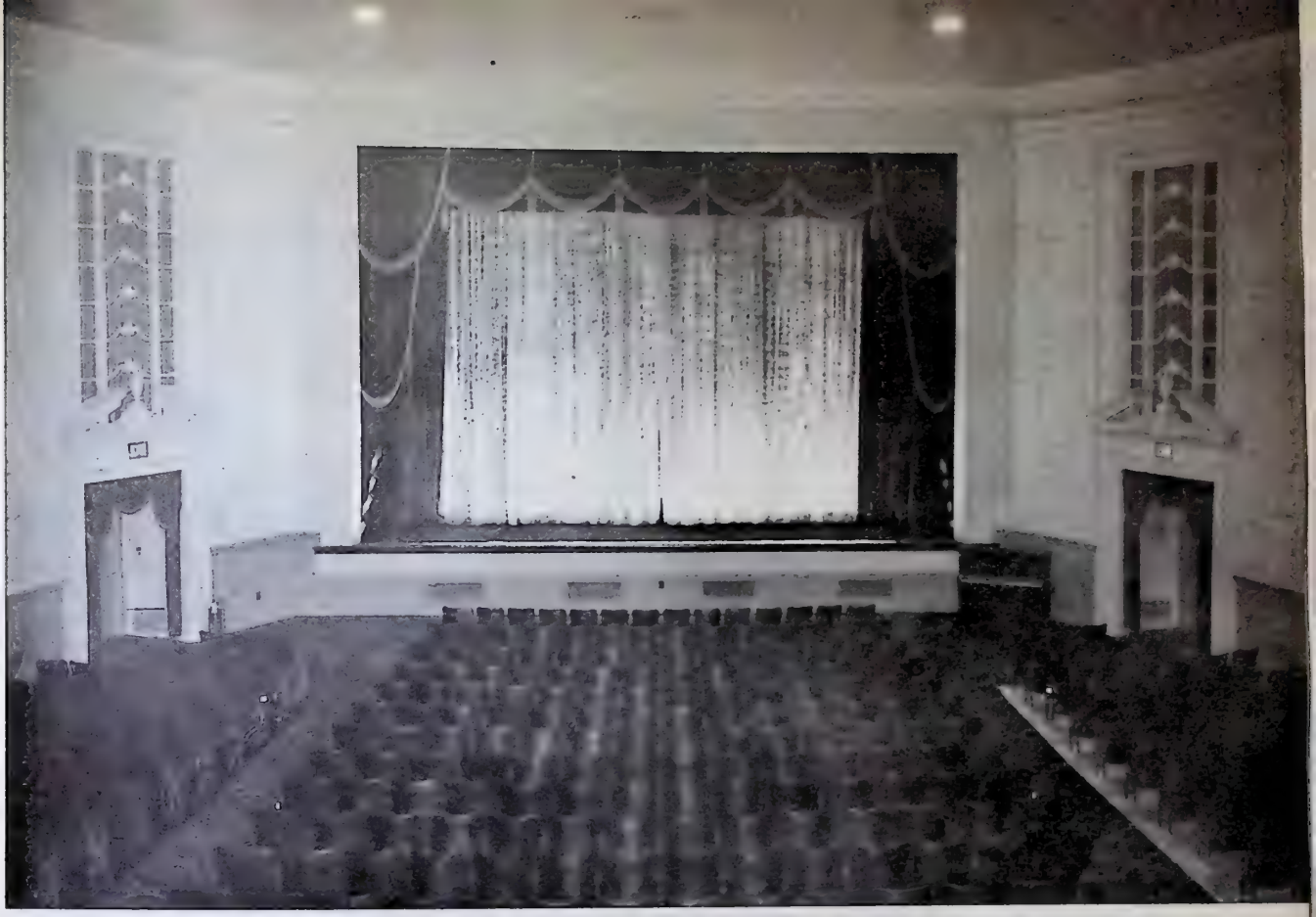
The Centre Theatre is located at 1513 Seminary Road and is the dominant feature in a new shopping center adjacent to a large housing development. The exterior is designed in the Colonial tradition, following the architecture of the adjacent housing development. Surmounting the serpentine stone base are the red brick walls, with white wood trim. The roof is of Buckingham slate.

The interior is also in colonial style, with black and white terrazzo in the lobby, walls finished with Colonial-type paper, and ornamental plaster cornices, and plaster ceiling. The lighting fixtures are of crystal glass. The foyer and lounge are similar, except being covered with carpet of predominantly red design. The auditorium has fabric over rock wool.

The toilet rooms have tile floors and wainscots. The ladies' toilet is predominantly of a peach color, while the men's room is green and black.

The foyer and lounge are furnished with Old Virginia antiques.

THE FOYER of the Centre Theatre presents a particularly interesting view. Note from the plan (opposite page) that, while the vestibule-lobby is perfectly centered in relation to the store, it is not centered on the auditorium because of the extra width of the stores which will eventually provide the theatre's right exit court. Accordingly, the entering patrons sees by one entrance to the auditorium, which automatically reserves the left vomitory for the exclusive use of patrons coming out after a show. The crystal glass lighting fixtures were obtained by the firm of Birschall Brothers. The vending machine is convenient.



THE AUDITORIUM of the Centre Theatre shows an effective utilization of the neo-Colonial school of modern architecture. The ceiling, forward portion of the side walls, and the cornices are of ornamental plaster. Further back, the side walls are treated with rock wool batts over which is laid gray and gold damask. Provisions were made for the installation of air conditioning when this equipment becomes available. The antiques with which the theatre abounds were obtained from collectors and dealers in Richmond as well as in Alexandria, a metropolis in Washington's day. American Seating Company's chairs have been installed here.

The Glebe Theatre is a fraternal twin of the Centre and, accordingly, the Arlington house may be reviewed at this point, before the reader turns to pages 116 and 117 for the pictorial presentation.

As in the previous case, the Glebe Theatre also follows the architectural trend of its locale and has the exterior designed in the Colonial tradition.

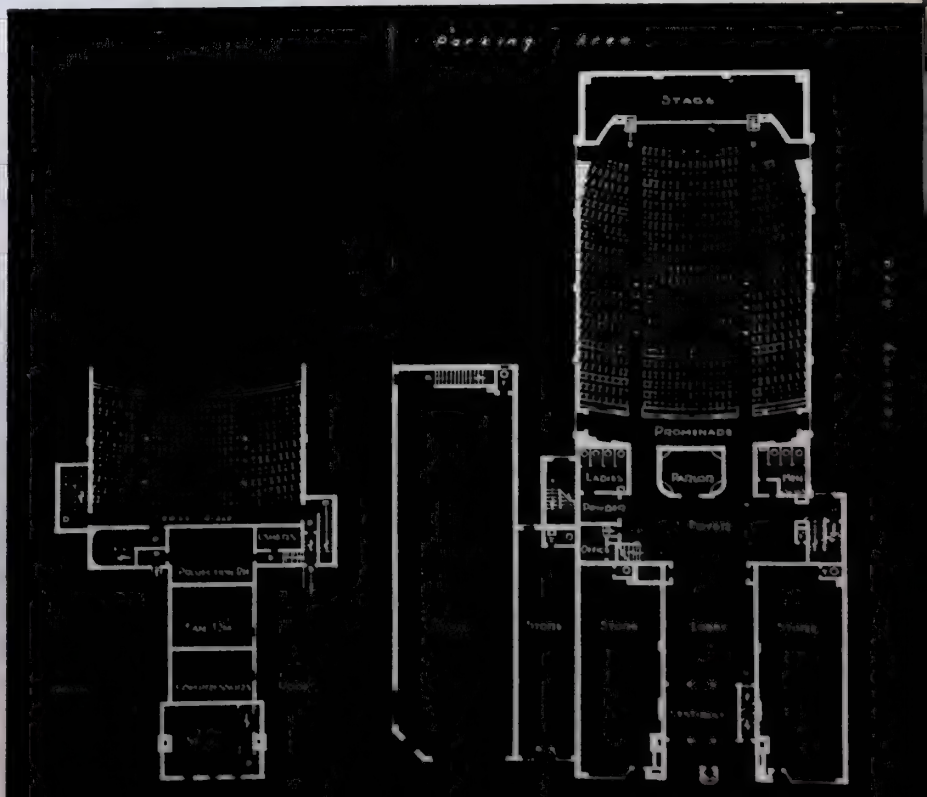
The interior of the theatre is designed in modernized Colonial manner. The lobby floor is surfaced with red and gold terrazzo. Lighting fixtures are of polished brass and crystal. The foyer and stairs are carpeted, as also are the aisles in the auditorium. The walls of the foyer and lounge are papered and have ornamental plaster cornices. The plaster ceilings are painted. The auditorium walls, erected from cinder block, are overlaid with damask with the design in white and gold. The lounge is furnished with antiques.

The toilet rooms of the Glebe Theatre have floors in black and white tile, with tile wainscots. The lounge has a black marbelized asphalt tile floor. The walls are painted a golden yellow, topped by a wood cornice. The ceiling is plastered.

With both theatres as they opened, the operating policy was that of subsequent-run, with an admission scale of 20, 35, and 40 cents, indeed "popular prices" for the executive and clerical employes of the government who will make up the bulk of the theatres' patronage.

The equipment installed in both theatres is detailed on page 117. Where different products were used in the two houses, mention is made in the captions of the exact item used.

THE FLOOR PLANS—of the main floor (right) and the balcony (left)—reveal an efficient arrangement of rooms, a notable element of which is the inclusion of a parlor between the entrances to the auditorium. Dumb-waiter service could be installed between the box office and the manager's office. It should be noted that the projection room has an emergency exit that leads to the roof of one of the stores. A similar audience exit is on the other side.



A $125,000, 750-Seat Theatre, in Modern Colonial Design, Comes to Arlington, Virginia

THE GLEBE THEATRE

THE GLEBE THEATRE, in Arlington Virginia, is the second of the two latest additions to the circuit operated by Neighborhood Theatre, Inc. It is a fraternal twin of the Centre Theatre (see pages 114 and 115) in the sense that it is thematically the same and that it was designed and built by the same architect and general contractor and, with two exceptions, identically equipped. The general theme is modern Colonial, with walls of red brick, white wood trim, and a Buckingham slate roof. The fore portion, including the vestibule and lobby, is designed to permit the addition of stores at both sides.

THE LOBBY floor is surfaced in red and gold terrazzo, but the foyer beyond, as well as the stairs and the auditorium aisles, are carpeted. The foyer and lounge walls are papered, with ornamental plaster cornices, and the plaster ceilings are painted. Note the line of entrance leads to the right of the two auditorium aisles.

THE LOUNGE is located on the second floor, over the lobby and vestibule with windows facing North Glebe Road. The room, reached by stairs at the right of the foyer, is furnished with genuine Old Virginia antiques. The lighting fixtures, of period polished brass and crystal were obtained through the Lightolier Company

REFERENCE CREDITS

THE CENTRE THEATRE

Alexandria, Virginia

THE GLEBE THEATRE

Arlington, Virginia

OPERATOR: Neighborhood Theatre, Inc.

ARCHITECT: John Eberson, with A. O. Budina, associate.

DECORATOR: Novelty Scenic Studios.

GENERAL CONTRACTOR: Doyle and Russell.

BOX OFFICE: Custom-made.

CARPETS: Crestwood, by Alexander Smith and Sons Carpet Company.

CHANGEOVERS: Weaver, by Weaver Manufacturing Company.

COIN CHANGERS: Brandt, by Brandt Automatic Cashier Company.

CURTAIN CONTROLS: Vallen, by Vallen, Inc.

DISPLAY FRAMES: Sealuxe, by Universal Corporation.

DRAPERIES: through Novelty Scenic Studios.

FILM CABINETS: Neumade, by Neumade Products Corporation.

FIRE EXTINGUISHERS: through Fire Equipment Company.

FURNITURE: Antique, through Alexandria and Richmond dealers.

GENERATORS: Transverter, by Hertner Electric Company.

LENSES: Cinephor, by Bausch and Lomb Optical Company.

PROJECTION LAMPS: Peerless Magnarc, by J. E. McAuley Manufacturing Company.

PROJECTION MACHINES: Simplex E-7, by International Projector Corporation.

REWINDERS: Golde, by Golde Manufacturing Company.

SCREEN: Walker PM, by Walker American Corporation.

SIGN AND MARQUEE: Regal Sign Company.

SIGN LETTERS: Wagner, by Wagner Sign Service.

SOUND: Simplex Four Star, by International Projector Corporation.

STAGE CURTAINS: through Novelty Scenic Studios.

SUPPLY DEALER: National Theatre Supply Division of National-Simplex-Bludworth, Inc.

TICKET-ISSUING MACHINE: Automaticket, by General Register Corporation.

TICKET CHOPPER: Newman, by Newman Brothers.

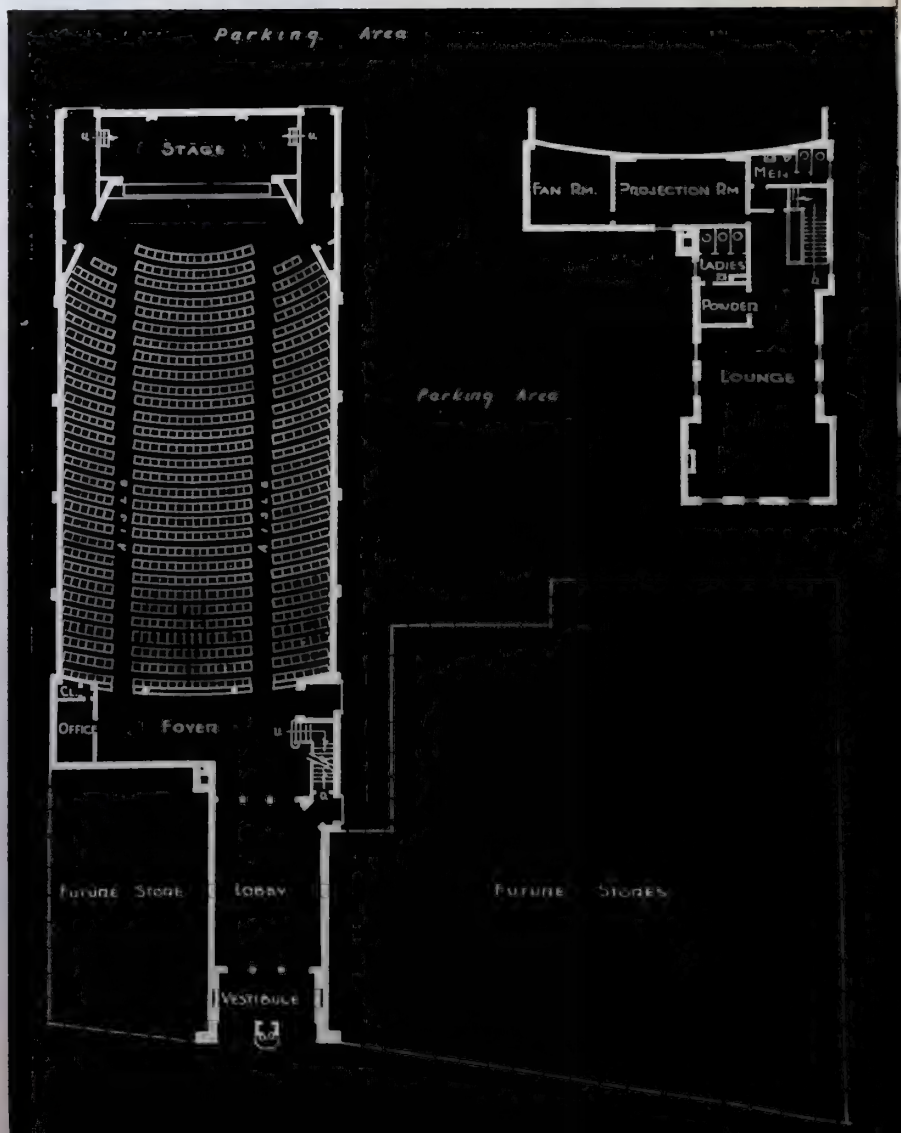
VACUUM CLEANER: by Kent Company, Inc.

VENDING MACHINES: through Berlo Vending Company.

WALL FABRICS: through Novelty Scenic Studios.

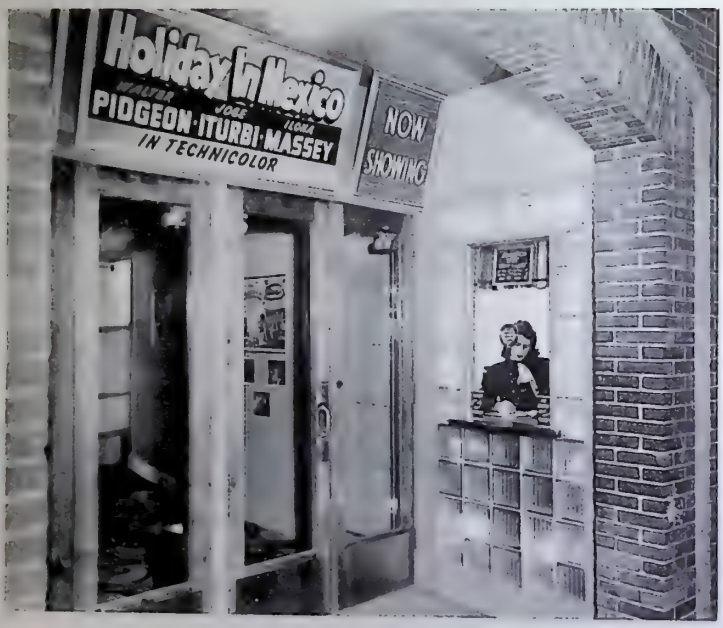
THE AUDITORIUM of the Glebe Theatre, in the fore section, is finished in plaster, with the side walls of cinder blocks covered with damask in tones of white and gold. The Ideal Seating Company provided 750 chairs for the auditorium. The equipment bill for this theatre is said to be $26,000. While the Glebe was built under the exigencies of war, the designers did not forget that air conditioning would be desired and subsequently installed.

THE FLOOR PLANS and plot plan reveal how the future was almost more in mind than the present. The first floor plan, at the left, reveals a spaciousness—including that of the stage—which should be more than adequate for years to come, even after the future stores become realities. Note also the placement of the lobby, so that the entering patron is more or less automatically routed down the right aisle and first seating made on that side.



The Old Armory Hall in Milford, Delaware, Is Transformed into a New Motion-Picture Theatre

THE SHORE THEATRE



THE BOX OFFICE, framed with glass blocks, is designed as an integral part of the Shore Theatre and is located at the right side of the entrance. Since this theatre has been created out of the old Armory Hall, one of the main architectural problems was to make the most out of what there was, holding the reconstruction work to a minimum. This, and the time in which the work was done, accounts for the presence of offices rather than stores.

Once a theatreman always a theatreman, it would seem, and there is scarcely an ex-operator who does not yearn for the day when he will be able to re-enter the field. Marsh Gollner is such a long-time theatreman, who, having some years back sold his properties to the Schine Circuit, Inc., returned to the business as an independent operator of a new motion-picture theatre.

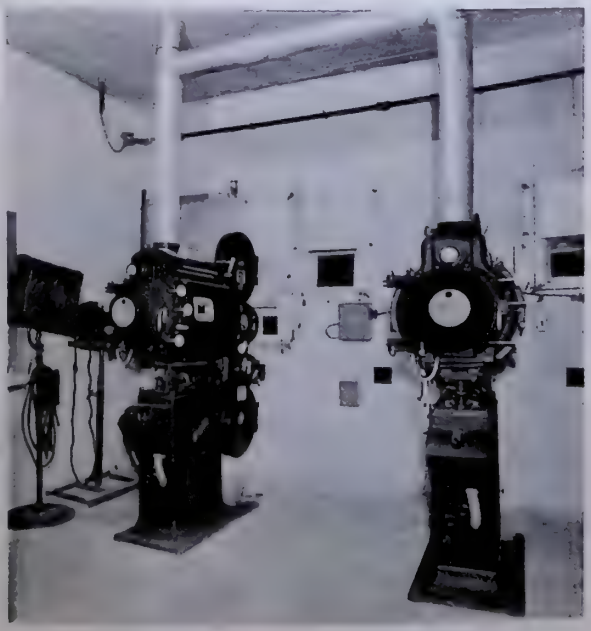
In association with Jay Pierce, local businessman, Gollner acquired the old Armory Hall, and commissioned Arthur Paul Hoppe to draw plans for the remodeling. On the main floor, the principal construction work involved the establishment of rest rooms and toilets, the shaping of the auditorium better to serve the sight-and-sound needs of modern motion pictures, and a boiler-room ell at the left rear corner of the building. On the second floor the major construction involved the new projection booth and the re-establishment of the building-wide corridor serving the offices. Also built was a flight of stairs to these offices, the street entrance thereto right opposite the box office.

Although situated on Mispillion Creek, Milford is close enough to salt water (about five miles) to be definitely marine-minded, and so the principal decorative theme is literally highlighted by the auditorium side-wall lighting fixtures whose ground glass shields are adorned with symbols of local and nautical significance.

As the theatre opened, the policy was two shows each evening with a matinee on Saturday, the whole on a subsequent-run film schedule.

THE CONCESSION AREA, equipped with candy counter and popcorn machine, is located on the left side of the lobby after passing the main entrance doors. Salesmen designers generally prefer to place this concession area in the direct entrance route, rather than to oblige the customers to cross the line of outgoing traffic.

THE PROJECTION ROOM, while somewhat narrower than might have been expected, is plenty wide to allow for proper working space, the extra depth of the room being put to good use with other standard items of equipment. The room is also equipped with a record player of the wall type, fastened on the left-hand wall.



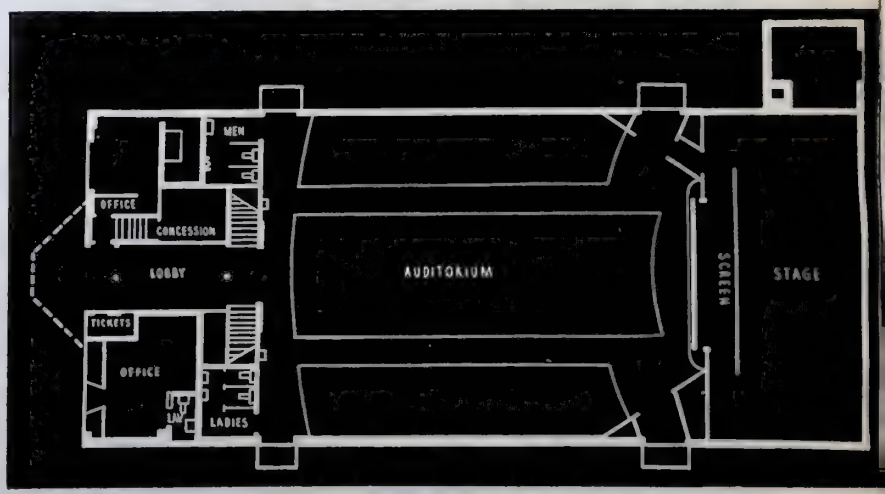
THE AUDITORIUM of the Shore Theatre takes full advantage of the decorative effects possible considering the character of the Celotex used as the acoustic material on the side walls and the fore part of the auditorium. The rear wall, the face of the projection booth, and the front of the balcony are fabric-surfaced. General use of drapes has been made with most of the doors. The striking decorative adjunct are the lighting fixtures, designed by Arthur Paul Hoppe, which, on the circular ground glass shields, are painted with designs of local and nautical significance. The lobby and auditorium aisles are fully carpeted.

REFERENCE CREDITS

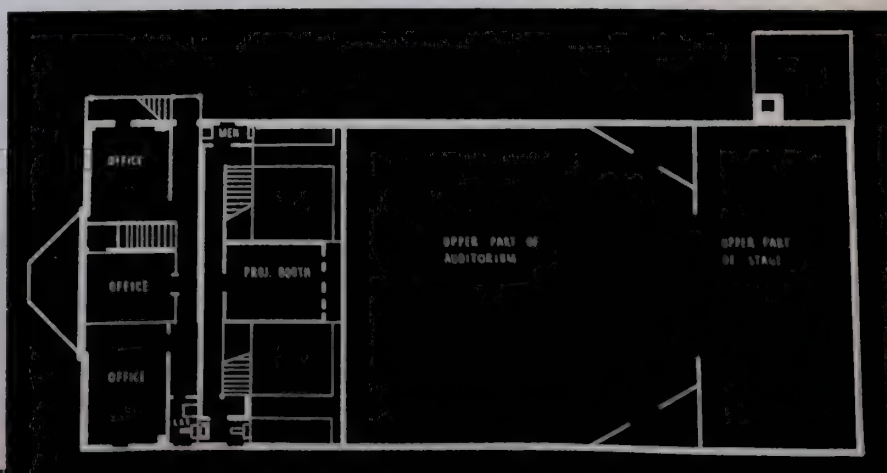
THE SHORE THEATRE

Milford, Delaware

OWNER AND OPERATOR: Shore Amusements, Inc. (Jay Pierce and Marsh Gollner.)
ARCHITECT: Arthur Paul Hoppe.
DECORATOR: National Drapery Studio.
ACOUSTIC MATERIAL: Celotex, by Celotex Corporation.
CARPETS: Crestwood, by Alexander Smith and Sons Carpet Company.
CHAIRS: Bodiform, by American Seating Company.
CHANGEOVERS: Weaver, by Weaver Manufacturing Company.
CURTAIN CONTROLS AND TRACK: Vallen, by Vallen, Inc.
DISPLAY FRAMES: Sealuxe, by Universal Corporation.
DRAPERIES AND STAGE CURTAINS: through National Drapery Studio.
FILM CABINETS: Neumade, by Neumade Products Corporation.
GENERATORS: Transverter, by Hertner Electric Company.
LENSES: Super Cinephor (Balcoted), f/2.0, by Bausch and Lomb Optical Company.
LIGHTING FIXTURES: designed by Arthur Paul Hoppe, manufactured by Voigt Company.
PROJECTION LAMPS: Peerless Magnarc, by J. E. McAuley Manufacturing Company.
PROJECTION MACHINES: Simplex E-7, by International Projector Corporation.
REWINDERS: Golde, by Golde Manufacturing Company.
RUBBER MATS, by Lorraine Rubber Engineering Company.
SCREEN: Walker PM, by Walker American Corporation.
SOUND: Simplex Four Star, by International Projector Corporation.
SUPPLY DEALER: National Theatre Supply Division of National-Simplex-Bludworth, Inc.
TICKET-ISSUING MACHINE: Automaticket, by General Register Corporation.
TICKET CHOPPER: Golde, by Golde Manufacturing Company.



THE FLOOR PLANS, for either the ground floor (below) or second-floor (above) level, reveal a compactness which probably stems from the fact that the Shore Theatre was created out of the old Armory Hall. The stairs opposite the box office lead to the second-floor offices, while the two sets of stairs at the end of the lobby, of course, lead to the 76-seat balcony. For both auditorium and balcony patrons, the sets of toilets are conveniently placed.



Two Thousand Seven Hundred Ninety Square Feet of Steel for a Rochester, New York, Theatre Screen

THE CENTRAL DRIVE-IN THEATRE

Motion pictures on what is said to be the largest outdoor screen in the world are being witnessed by the citizenry of Rochester, New York, who motor out Long Pond Road to the Central Drive-In Theatre.

The theatre's giant screen—62 feet wide and 45 feet high—is made up of a series of all-steel panels evenly spaced at relative distances apart to lessen the effect of wind and accommodate warping from exposure to the elements. Constructed on two 250-ton sunken concrete bases, the huge screen is capable of withstanding extremely high-velocity winds.

Built into a 75-foot structure, the screen is plainly visible to a 1,250-car audience. Fourteen ramps accommodate 850 automobiles, with "standing room" for an additional 400.

A novel innovation of the $100,000 project is the 1,200-square-foot balcony, located below the screen, where theatre patrons may dance before and between performances. It was expected that the theatre would present several "name" dance bands each season as added attractions at no extra cost to customers.

Other outstanding characteristics of the new theatre are a glass brick marquee, lighted in full color, and a $30,000 projection booth complete with sound and projection equipment. Lenses, mirrors, and optical in the projection machines were produced by the Bausch and Lomb Optical Company. The 3½-inch Super Cinephor high-precision projection lens is coated with metallic fluoride to increase light transmission. Other precision optical parts, vital in the performance of the projectors, include a condenser system which transmits light onto the film, and an optical-sound system. An arc-control mechanism, consisting of two lenses and a mirror, facilitates feed control of the light supplying positive carbon by maintaining it in correct position with respect to the condenser system.

The optical-sound system consists of a condenser, slit, and objective which produces a controlled beam of light which scans the sound track. The light, passing the sound track, is directed by means of a small, silvered lens mirror into a photo-electric cell, where the light energy is converted to electrical energy and transmitted to amplifiers and loudspeakers.

The Balcoted Super Cinephor works at an aperture ratio of *f*/2.0. More light is delivered on the screen with a resulting and definitely noticeable sharper, crisper definition. The total gain in speed over the previous series amounts to 70 percent.

THE CENTRAL DRIVE-IN THEATRE is, as is generally the case in these automobile theatres, dominated by the screen tower, seen here as twilight descends on the countryside and the lights are turned on. Mounted on the other side of this structure is the motion-picture screen, in this case said to be the largest in the world. The house is erected on two 250-ton sunken concrete bases, with the screen constructed evenly-spaced steel panels. The screen is 62 feet wide and 45 feet high. The theatre represents an investment estimated at some $130,000, of which some $30,000 is accounted for by the equipment installed in the project.

THE AUDITORIUM of the Central Drive-In Theatre will "seat" 450 cars, with a "standee area" accommodating some 450 more. The auditorium proper is made up of fourteen ramps. On the center line, and at the correct distance from the screen, is the projection building, which houses a fully equipped projection booth not unlike that in any orthodox theatre, except that the angle of projection is up, not down, from the horizontal. The projection room takes advantage of the latest advances in projection optics, including the use of a quartz condenser system and lenses coated with a metallic fluoride to increase the transmission of light.

REFERENCE CREDITS

THE CENTRAL DRIVE-IN THEATRE
Rochester, New York

OWNER AND OPERATOR: E. Graden, Elmer H. Ellis, and William Tishkoff.

CAPACITY: 850 cars, with waiting space for 400 additional automobiles.

COST OF THEATRE (EXCLUSIVE OF EQUIPMENT): $100,000.

COST OF EQUIPMENT: $30,000.

CHANGEOVERS: Strong Zipper, by Essannay Electric Manufacturing Company.

COIN CHANGERS: Johnson Lighting, by Johnson Fare Box Company.

FILM CABINETS: Neumade, by Neumade Products Corporation.

GENERATORS: Transverter, 150-300 amperes, by Hertner Electric Company.

LENSES: Super Cinephor (Balcoted), f/2.0, 3½-inch, by Bausch and Lomb Optical Company.

PROJECTION LAMPS: Peerless Hycandescent, by J. E. McAuley Manufacturing Company.

PROJECTION MACHINES: Simplex E-7, mounted on heavy-duty Simplex pedestals, by International Projector Corporation.

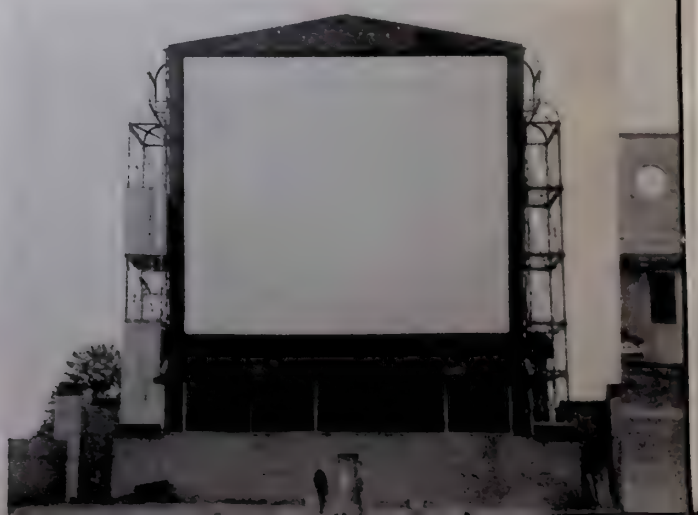
REWINDERS: Neumade Dynamic, by Neumade Products Corporation.

SOUND: Simplex Four Star, by International Projector Corporation; with amplifiers and speaker system, by Altec Lansing Corporation.

SUPPLY DEALER: National Theatre Supply Division of National-Simplex-Bluclworth, Inc.

THE ENTRANCE to the theatre is reminiscent of the collection booths at toll bridges. Here usherettes act as the liaison between incoming patrons and the ticket booth. Under this system, the cashier never comes in direct contact with the patrons, and acts strictly as an issuer of tickets and the maker of change for the usherettes.

THE SCREEN TOWER in construction reveals the steel frame work which permits the structure to withstand high-velocity winds. Below the screen is a 1,200-square-foot balcony for dancing. Until in-car speakers are obtained, trumpet speakers are located on poles near the screen and around the rim of the parking area.



A Giant Waterfall Sets Off, But Does Not Denominate, a Theatre Near Syracuse, New York

THE KALLET DRIVE-IN THEATRE

The Kallet Drive-In Theatre is located west of Syracuse, New York, on Route 5 between Fairmount and Camillus. The plot of land consists of 35 acres, bounded by two highways. The back of the grounds, not bordered by highways has been set out with poplar trees which will eventually form a screen for the auditorium. There are some 800 rose bushes planted around the 15 acres of lawn.

The falls effect is on the highway side of the screen tower. It is built in three tiers, over which flows 3,000 gallons of water a minute, and hits each projection on its way down. This falling water is illuminated by 28 colored floor lights. The circular cutouts on the siding contain fluorescent tubing, which also lights the falling water. The statue at the base of the falls is, including pedestal, 18 feet high.

As the patron drives in, he meets two ticket booths, with two girls in front of each to purchase the admission tickets for the patrons, and four men to clean windshields. It is interesting to note that the management imposes a minimum charge of two adult admissions (at 50 cents each) to each car.

When the 800-car ramp space is filled, there is a waiting parking space for some 350 more cars awaiting entrance to the area of the theatre proper.

Adjacent to the frame of the screen are the theatre offices and concessions.

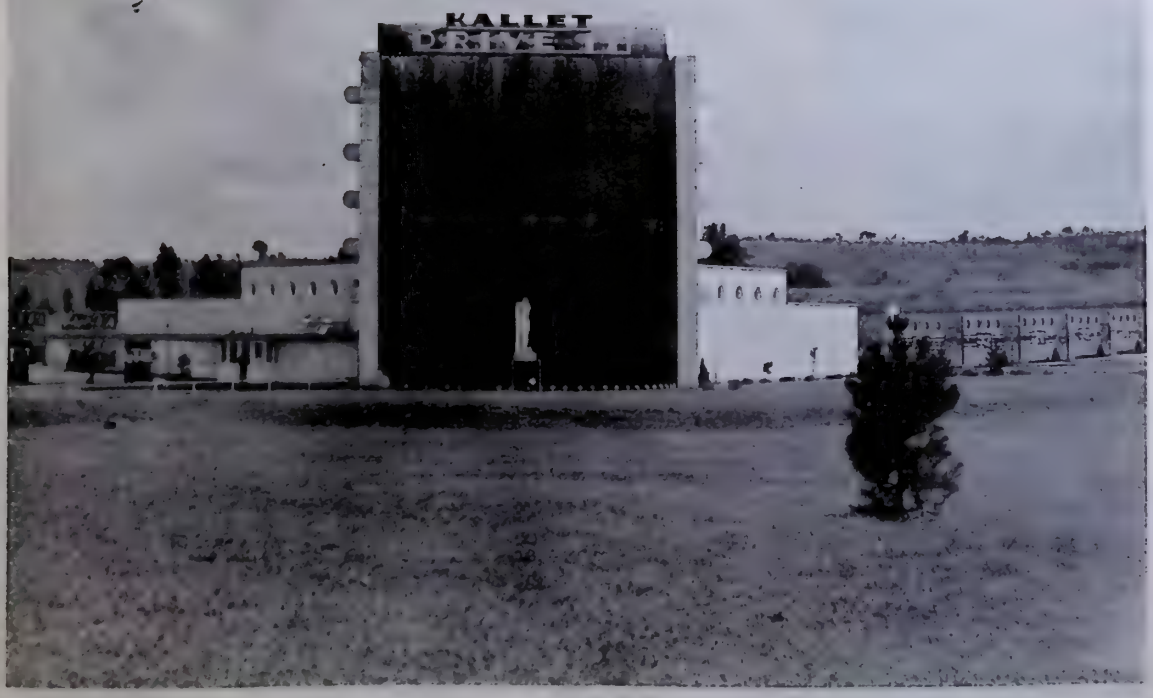
The booth is 45 by 60 feet, located approximately 208 feet from the screen. At the back of the building, there are comfort rooms, and space for more concessions.

There is a four-lane traffic entrance to the grounds and the same in leaving on the other street. The grounds can be cleared of 800 cars in 17 minutes, with little confusion attached to this rapid emptying of the grounds due to the arrangement of the driveways.

In the 160 feet between the screen and the first ramp, there is a circular dance floor (cement surfaced). Music is provided before and between shows. The area is equipped with lawn furniture and landscaped with roses.

Among those associated with the theatre are Michael J. DeAngelis, architect; Altec Service Corporation, installation of sound and projection; H. E. Howard, marquee and electric signs, and National Theatre Supply Division of National-Simplex-Bludworth, Inc., motion-picture equipment.

THE KALLET DRIVE-IN THEATRE, on Route 5, between Fairmount and Camillus (near Syracuse), New York, is dominated by a man-made—DeAngelis-designed—waterfall, forming the principal decorative aspect of the street side of the screen tower. It is built in three tiers, over which flows 3,000 gallons of water a minute and, as it hits each projection, makes a beautiful scene. This falling water is illuminated by 28 colored flood lights. The statue in the pool at the base of the falls is 18 feet high, including pedestal. This decorative feature is the item that gave the theatre its first-assigned name, the Falls Theatre.



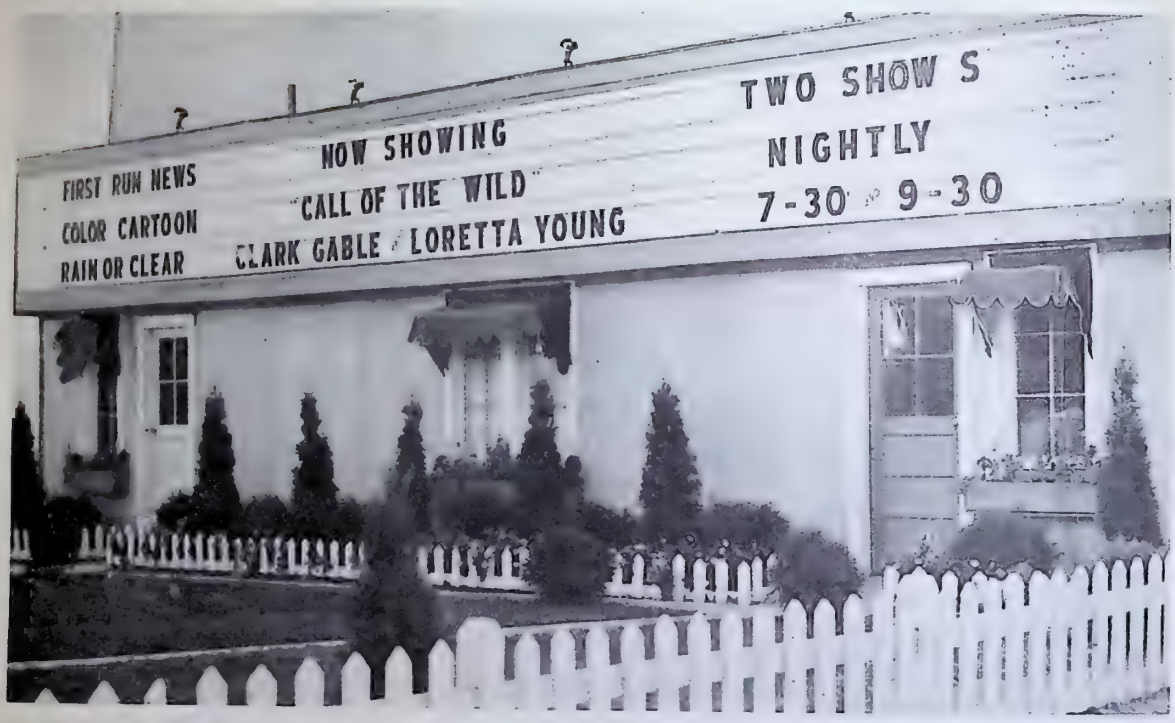
GENERAL VIEW of the auditorium of the Kallet Drive-In Theatre shows the arrangement of the ramps, the first of which is 160 feet from the screen, and the parking stalls indicated by the in-car speaker stands. When the ramps are filled, 800 cars are in the theatre. Waiting space for 350 more is provided. The projection building, approximately 208 feet from the screen, is 45 by 60 feet. At the rear of this building are located the rest and toilet rooms for men and women, as well as space for additional concessions. In a little more than 15 minutes, a capacity house can be emptied with a minimum of confusion due to layout of ramps, drives.

GENERAL VIEW of the theatre shows the screen tower in relation to the entrance and the announcement-board pylon at the side of the main-traffic street. In this area are the offices, and the concessions at which are sold popcorn, sandwiches, hot dogs, and soft drinks. Projection building has space for other concessions.

THE ENTRANCE, with its two box offices, is manned by four usherettes, two for each cashier, stationed in front for the purchase of admission tickets for the patrons. There are also four men to clean windshields while the purchase is being made. There is a four-lane traffic entrance to the theatre, and a four-lane exit.

On Ohio's Route 5, Near Miamisburg, a New 350-Car Theatre Is Opened on a 10-Acre Lot

THE MIAMI CRUISE-IN THEATRE



THE MIAMI CRUISE-IN THEATRE (above) shows an architectural treatment to carry out the rural theme of the theatre's locale, its white picket fences and the doors and windows of residential character.

THE SCREEN TOWER from the highway side (below) shows the use of the blank expanse as background for a gigantic name sign. The long program board provides ample space for all possible types of billing.

REFERENCE CREDITS

THE MIAMI CRUISE-IN THEATRE

Miamisburg, Ohio

OWNER AND OPERATOR: L. A. Clenmer.

CAPACITY: 350 automobiles.

COST OF THEATRE (EXCLUDING EQUIPMENT): $35,000.

COST OF EQUIPMENT: $8,500.

CHANGEOVERS: DeVry, by DeVry Corporation.

FILM CABINETS: Neumade, by Neumade Products Corporation.

LENSES: Brilliante, by DeVry Corporation.

PROJECTION LAMPS: Strong Mogul, by Strong Electric Corporation.

PROJECTION MACHINES: DeVry, by DeVry Corporation.

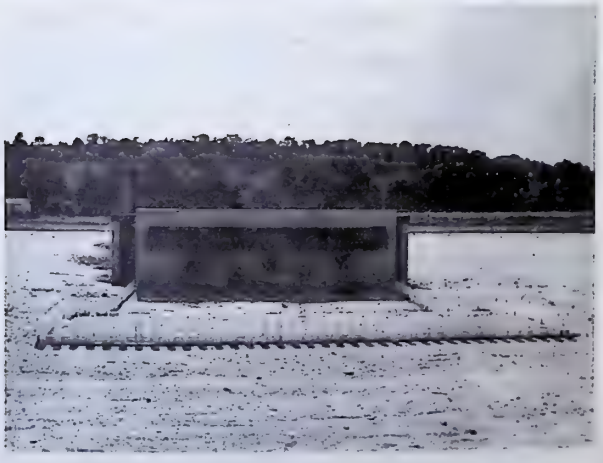
RECTIFIERS: by Strong Electric Corporation.

REWINDERS: Golde, by Golde Manufacturing Company.

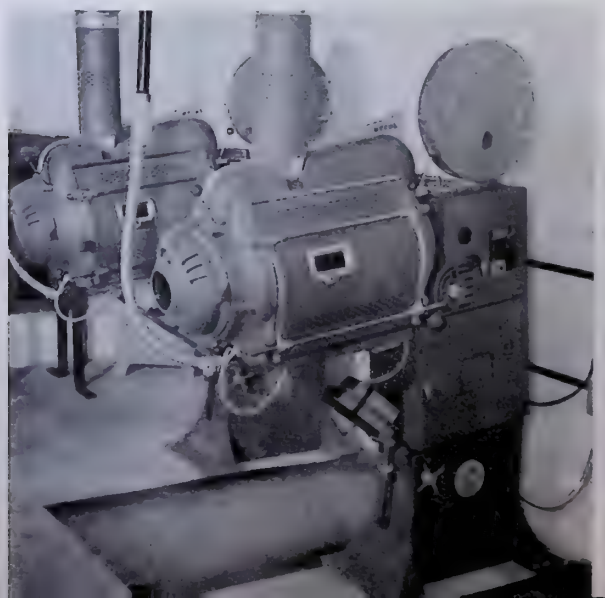
SOUND: DeVry soundheads and amplification, by DeVry Corporation; speaker system, by Altec Lansing Corporation.

SUPPLY DEALER: The Dayton Film, Inc.

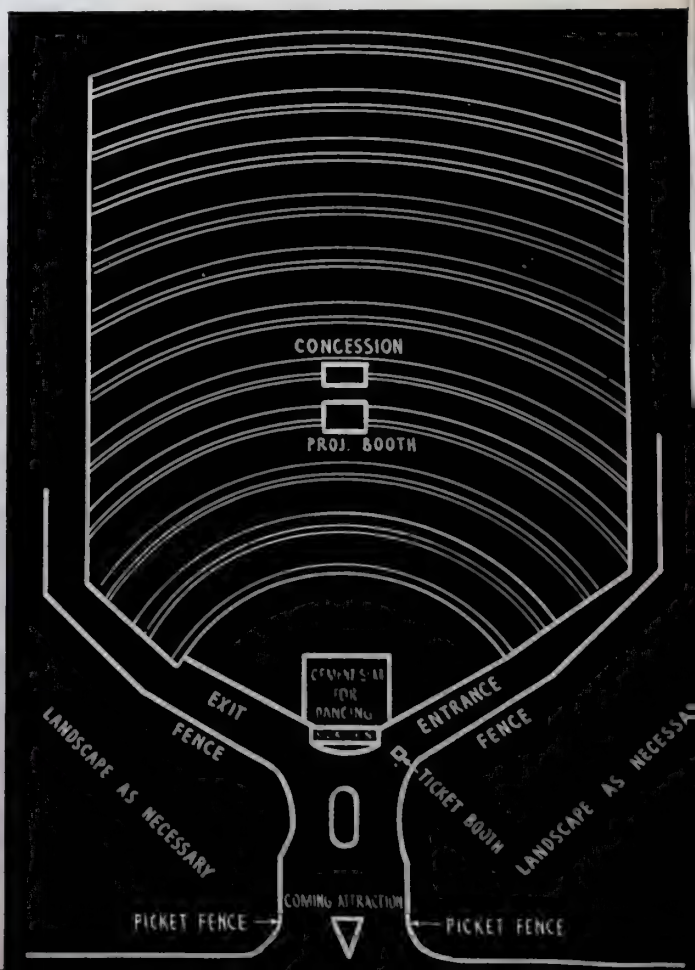
THE AUDITORIUM (above) of the Miami Cruise-In Theatre is shown here in a partly completed condition and shows the relative positions of the screen tower and the projection building. In front of the first ramp will be several rows of wood chairs for accommodation of pedestrian customers, or those who do not care to drive in.



THE PROJECTION BUILDING (above), which faces the setting sun, has the projection and observation ports protected by an awning. The low line of pickets prevents cars being parked too close. The projection room itself (below) shows the up-tilted projection machines, characteristic of virtually all automobile theatres.



A GENERALIZED PLOT PLAN (below) of the outdoor theatres constructed and equipped by Dayton Film, Inc., shows the general location of the projection and concession buildings and the screen building. A dancing area is provided at the base of the screen on the auditorium side. The site is landscaped as desired.



A 10-Acre, Outdoor Auto Theatre Is Built and Equipped for $25,000 Near Greenville, Ohio

THE SPEEDWAY AUTO THEATRE

THE SPEEDWAY AUTO THEATRE, set back about 500 feet from the Greenville-Dayton turnpike (Ohio Route 49), presents a plain "front" to the passing traffic, with the screen tower rather unadorned save for the name in black letters, made to stand out at night with neon-tube trim. The tower, painted white, and, therefore, plenty prominent even by day, is constructed of wood and asbestos. The theatre cost $15,000, and the equipment $10,000.

REFERENCE CREDITS

THE SPEEDWAY AUTO THEATRE

Greenville, Ohio

OWNER: Glen and Lester Schultz.

OPERATOR: M. Harliss.

CAPACITY: 400 cars.

COST OF THEATRE (EXCLUDING EQUIPMENT): $15,000.

COST OF EQUIPMENT: $10,000.

CHANGEOVERS: DeVry, by DeVry Corporation.

FILM CABINETS: Neumade, by Neumade Products Corporation.

LENSES: DeVry Super, Series II, by DeVry Corporation.

PROJECTION LAMPS: Strong Mogul, by Strong Electric Corporation.

PROJECTION MACHINES: DeVry No. 10, by DeVry Corporation.

RECTIFIERS: Strong, 80-ampere, Tungar, by Strong Electric Corporation.

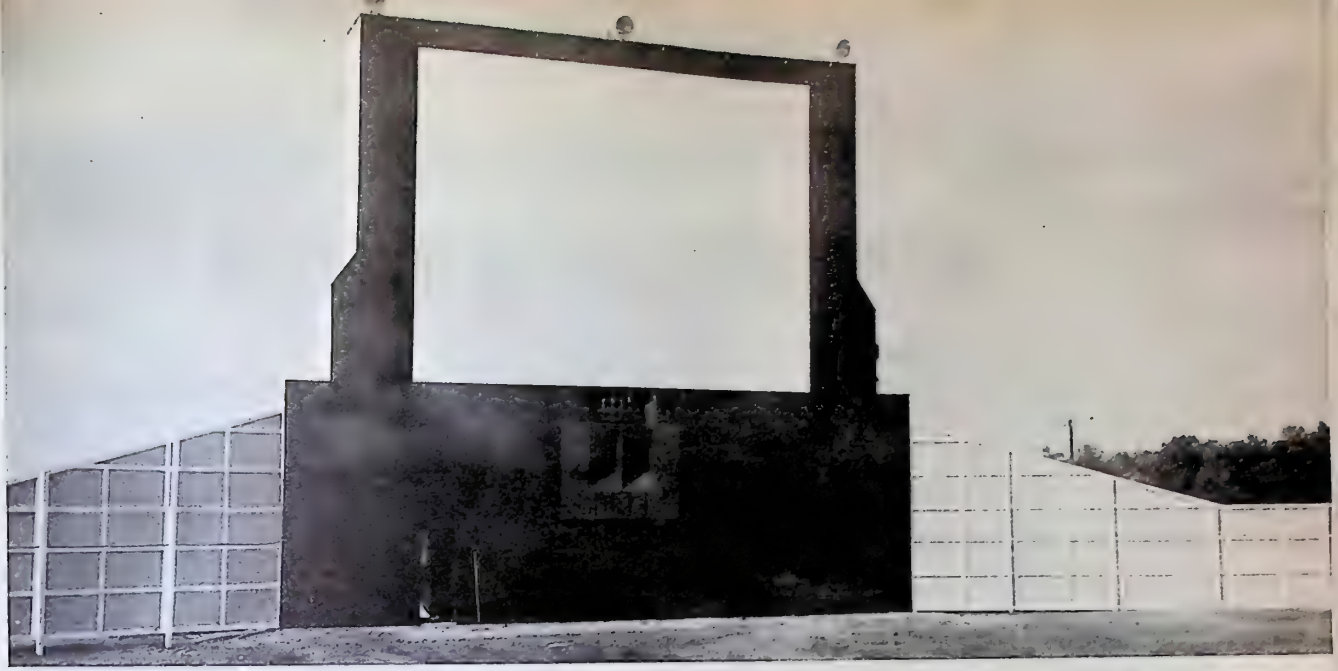
REWINDERS: Golde, by Golde Manufacturing Company.

SCREEN: Asbestos.

SOUND: Soundheads, by DeVry Corporation; amplifiers and speaker system, by Altec Lansing Corporation.

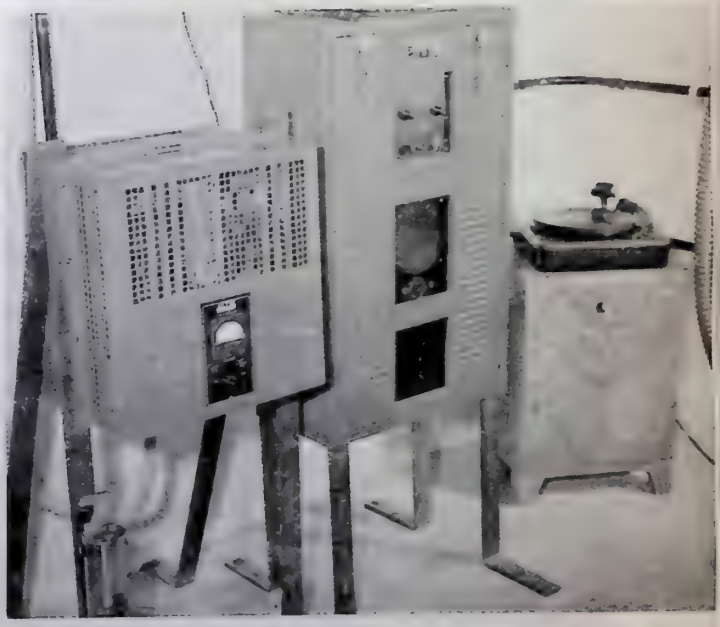
SUPPLY DEALER: Dayton Film, Inc.

THE AUDITORIUM of the Speedway Auto Theatre will accommodate in its 10 acres some 400 cars. The screen tower is constructed of wood and asbestos and painted white, with the projection building (at the left of the picture) fabricated from cement blocks with a stucco facing. A population of 40,000 is served by this theatre, which opened as a second-run situation, with an admission of 50 cents for adults and 20 cents for children. For a general idea of the plot plan of this theatre, and others designed by the Dayton Film, Inc., the reader is referred to the drawing appearing with the presentation of the Miami Cruise-In Theatre, on page 125.



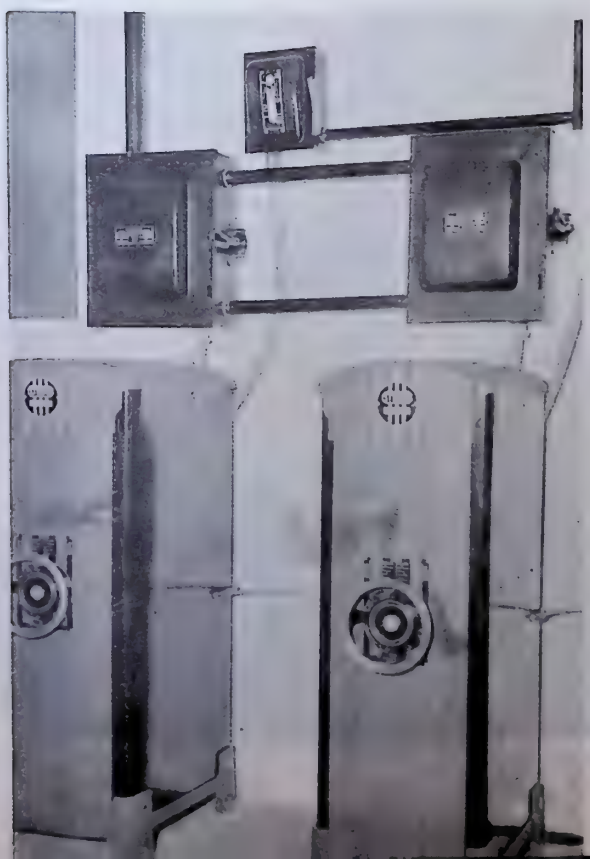
SOUND AND PROJECTION in auto theatres, as is the case for all types of cinemas, is of paramount importance. On this page is shown a series of pictures of the equipment in the Speedway Auto Theatre. At the top of the page is a near view of the screen tower, showing the placing of the multicellular horns below the screen.

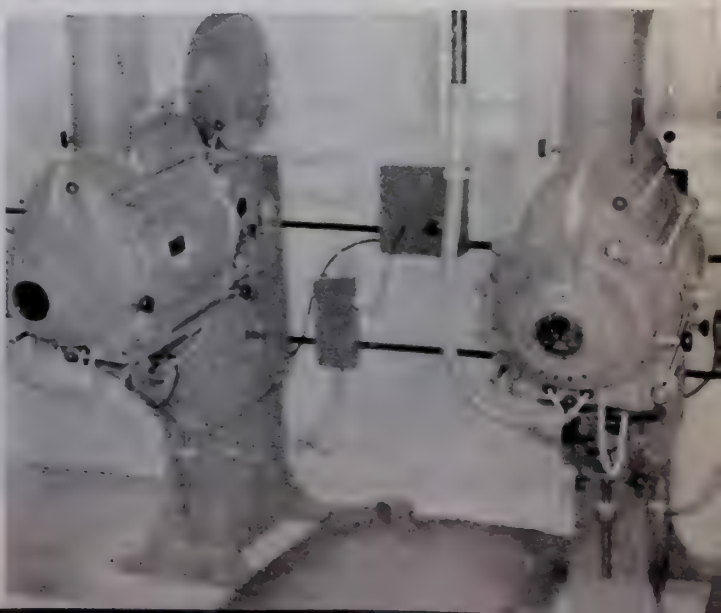
THE AMPLIFIERS, seen in the picture to the right, boost the electrical waves to such an intensity that they operate through the loudspeakers to produce sound of theatre-worthy quality and quantity. The apparatus is by Altec Lansing Corporation. Included in the booth is a turntable and pickup for the playing of records.



THE 80-AMPERE, TUNGAR RECTIFIERS (bottom left picture) are typical of those used in theatre of the usual sort, and are manufactured by the Strong Electric Company, with double-throw safety switches by the Westinghouse Electric Corporation. The direct current is fed to the Mogul arc lamps, also made by Strong Electric.

PROJECTION EQUIPMENT (lower right picture) further emphasizes the fact that regulation theatre items are used, such as the DeVry No. 10 projectors, DeVry sound heads, and Mogul lamps shown here. High-power lamps, with fast, coated lenses, are of particular importance in outdoor theatres. because of the desired picture size.





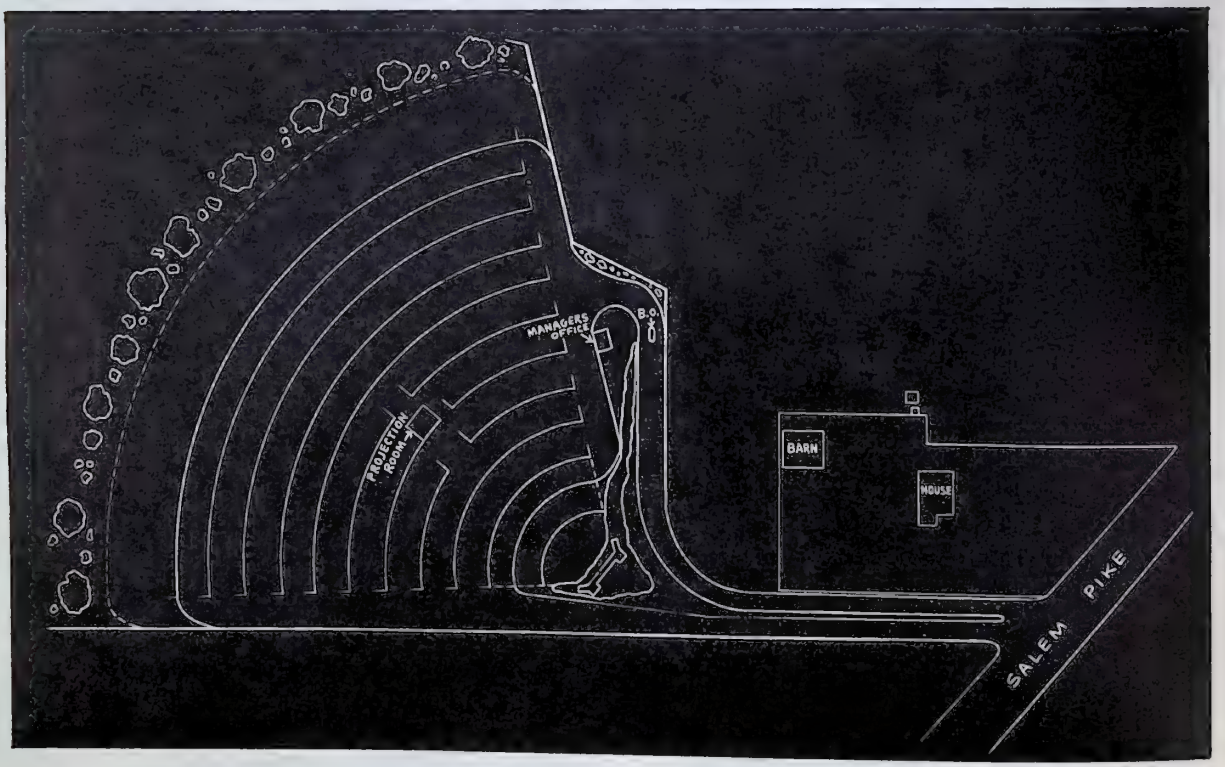
Near Dayton, Ohio, a 7-Acre Auto Theatre Provides Space Now for 400 Cars, and More Later

THE SALEM DRIVE-IN THEATRE

THE SALEM DRIVE-IN THEATRE, owned and operated by Paul Swinger and Robert Gump, and located just north of the limits of Dayton, Ohio, was designed by S. Herbert Taylor, of Park-In Theatres, Inc., owners of the drive-in patents. Four hundred cars can be "seated" on these 7 acres. Sound is Altec, with Jensen speakers.

IN THE PROJECTION BUILDING has been installed, by Dayton Film, Inc., changeovers, Brilliante Series II coated lenses, projection machines, soundheads, and rewinders of the DeVry Corporation; Strong Magul lamps and rectifiers by Strong Electric Corporation, and booth accessories by Neumade Products Corporation.

THE PLOT PLAN of the Salem Drive-In Theatre (constructed under the provisions of U. S. Patent 1,909,537) shows the entrance road that, as it turns toward the island box office, increases about 50 percent in width, permitting two lines of traffic at this point. The manager's office, situated, not in the screen tower as usual, but is a separate building located between the box office and the auditorium proper. Atop this structure is an observation deck from which all parts of the theatre may be surveyed. The design provides for the later addition of ramps. The exit drive also narrows toward the distal end.



The Rebirth of Baltimore's New Theatre

All New But the Walls and Roof Is Theme in Seven Series of Progression Pictures

The entire work of remodeling New Theatre, Baltimore, from the time of tearing out the existing facilities until the formal opening on February 13, 1946, was done in approximately 90 days. This represented maximum efficiency and speed under extremely trying conditions due to shortage of materials, contract time required in which to complete the work, and unforeseen and fortuitous difficulties which arose during the work.

The complete interior of the theatre was stripped to the bare walls, to the bare earth floor, and to the framework of the ceiling. Two months were consumed in stripping the interior of the building, preparing for and erecting the structural steel at a rapid pace. The contractor was then faced with doing all of the actual construction within one month. There was a great problem in doing this work in a confined area where it was necessary to utilize a great number of men and move tons of material in and out of the building without creating utter chaos and confusion. This required the utmost in ingenuity and patience. The problem was overcome by suspending scaffolding from the existing roof frame to provide a working floor for the lathers, plasterers, electricians, air-conditioning men, and the like. An unrestricted working area was thereby provided below for the other phases of the work.

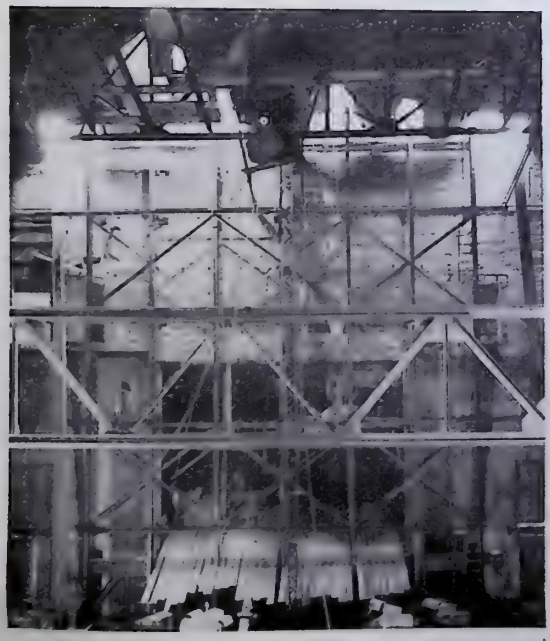
The carpenters completely formed the balcony and mezzanine in one week. The concrete for this part of the structure was poured in 16 hours by means of a concrete pump and pipeline to a 40-foot height. Another interesting phase of the work was the highest shoring and underpinning job ever attempted in Baltimore city. Over 200 tons of masonry were shored up 68 feet above the ground.

All pictures in this picture story are by the Hughes Company and are presented here through the cooperation of the Baltimore contractors.

PRELUDE. Following the complete clearing out of everything in the theatre, leaving but the outside walls and the ceiling, in moved were the gigantic steel girders that would be used for constructing the balcony—one shelf to replace the earlier two—and for other construction in the theatre. Here are two mighty I-beams being backed up to the theatre, a masterpiece of truck-and-trailer manipulation on a Baltimore street that was never laid out for this purpose! But these girders went in, as did countless other items that virtually built from the ground up a brand new theatre for the entertainment of the nearly 1,000,000 people of the city.

DECEMBER 5, 1945—The remodeling of the New Theatre gets under way. Before this, however, the complete interior of the theatre had been stripped to the bare walls, to the bare earth floor, and to the framework of the ceiling. Yet can be seen the old proscenium opening, the walls around which will soon come down, and, of course, with them, the remaining traces of the old air-conditioning duct system. It was by eliminating most of the old stage that additional seating capacity was achieved and, also, to permit an unusual treatment of that portion of the theatre, to be noted further on in this presentation.

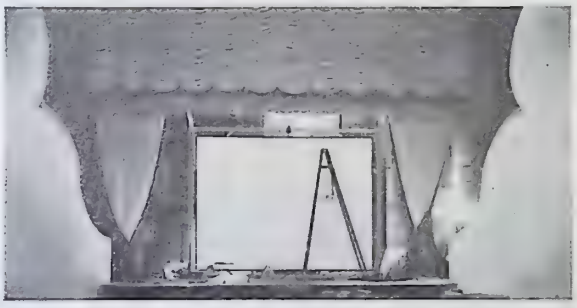
DECEMBER 15, 1945—The knocking down of the proscenium wall has started, and the lumber placed within easy reach for workmen needing it. The door, vaguely seen in the background of these two pictures, will soon be walled up. The proscenium was eliminated in order that additional seating capacity could be given.



REBIRTH OF A THEATRE: THE STAGE

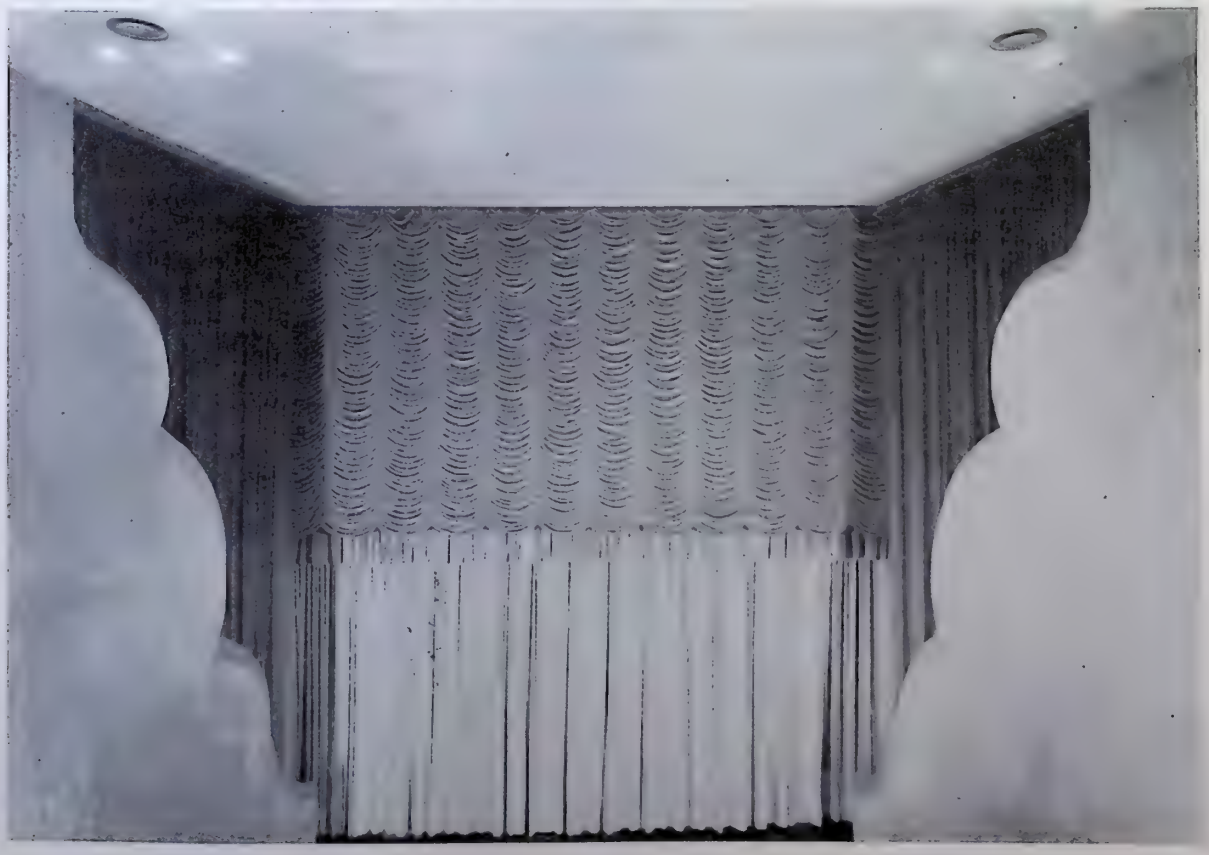
JANUARY 21, 1946—The old proscenium wall is gone. Seen here is part of the pipe-line system for delivering concrete to the desired place. A scaffolding suspended from the existing roof frame permitted unrestricted working space on the floor level for lathers, plasterers, electricians, air-conditioning men, and the like.

FEBRUARY 8, 1946—A detail view of the stage-side architectural treatment shows how the traditional proscenium-arc idea has been completely discarded. The huge triangular panel, scalloped along the screen-side hypotenuse, serves to direct the attention forward, as well as to form necessary wings when the stage is used.



FEBRUARY 9, 1946—The new stage (above takes shape, rear-wall openings have been bricked out, new handlings installed. Two days later (below), chairs have been installed in the auditorium, and progress is being made on the installation of the sound screen. The unorthodox stage now becomes more apparent.

FEBRUARY 13, 1946—The new New Theatre is ready for its first viewing. All the work was accomplished in approximately 90 days, from the time the work was started. The work was done by the Baltimore Contractors, through whose courtesy these series of progression photographs (by the Hughes Company) have been received and presented here. While a usable stage area has been retained, the screen position being more "upstage" than originally, the new position permits an architectural treatment that, as far as is known, is unique in the annals of theatre design. The forward decorative accent is on drapes.



FEBRUARY 4, 1946—Remodeling the foyer of any theatre is, of course, one of the later tasks, and, in the case of the New Theatre, there is no exception to the rule. And here, this particular job was started and completed during the last fortnight of the contractor's three-month task. Already on this date, considerable advance has been made, with the ceiling completely plastered and finished, and the workmen preparing to apply the final treatments to the side walls. At this point, the foyer hardly has any aspect of that upon which, less than two weeks later, the first-nighters will gaze, and be unrestrained in their compliments.

REBIRTH OF A THEATRE: THE FOYER

FEBRUARY 6, 1946—In a couple of days, the walls of the foyer have been finished up to the final surfacing, and the lobby's right wall prepared for receiving the black, glossy surfacing material. The metal framework for the glass doors and for the clear-glass lintel begins to look less like part of the scaffolding and the staging for the workmen and more like the things they will ultimately become. (All photographs are by the Hughes Company.)

FEBRUARY 11, 1946—A little over a week has passed since the first picture in this series was taken, and now the walls are completed, and the wear-saving carpet matting has been laid. The workmen are busy at work installing the large, glass exit doors, and putting the finishing touches on the outer portion of the foyer. The railing around the lower-level stairwell—designed with a porthole effect instead of the usual type of substantial newels—has been completed. In the up-curved portion of the ceiling (not shown) over the doors is a recessed area, backlighted by fluorescent tubes, for the announcement of the next attraction.

FEBRUARY 13, 1946—The entrance of the New Theatre is wide open, with the impression of expansiveness augmented through the use of glass and other highly reflective surfaces. The box office, located at the side, rather than the customary island style, helps to give additional entrance and exit space, as well as permitting a more spacious cubicle for the sellers of tickets. The ceiling lighting, placed behind ground glass, results in a soft, evenly diffused light all over the access area. Specially created art work, set in lighted poster frames, help to maintain the character of the New Theatre, as well as its screen program.

FEBRUARY 13, 1946—The construction work of the Baltimore Contractors, as well as the labors of the decorators and everyone else, on the foyer of the New Theatre is completed, and the management has received the first consignments of the many floral congratulations. While the foyer area is not especially large, an illusion of magnitude is achieved through the use of the clear-glass doors (through which the store windows across the street may be seen) and the installation of a large wall mirror. The decorative plainness of the area is accentuated by the use of a carpet pattern, though theatrical, is subdued in effect.

REBIRTH OF A THEATRE: THE BALCONY

OCTOBER 22, 1945—Typical of theatres of its era was the New, with its two balconies and great domed ceiling and a projection booth that seemed something of an architectural afterthought rather than an integral part of the structure. Here are the early stages of tearing out all semblances of the old era. Note particularly the designs on the balconies' rails, and the pedestaled busts that have not yet fallen victim to the onslaughts of the builders.

DECEMBER 5, 1945—In six weeks the two balconies and the old projection booth have disappeared, and the debris cleared away so that the subsequent tasks may proceed according to schedule. Still visible at this time are the sites of the balconies and other appurtenances of the old New, ready to give way to the new New.

DECEMBER 5, 1945—The corner opposite that shown in the previous picture, of course, tells the same story, with the saffolding in place for the workmen to remove the last vestiges of the old construction. From these pictures can be obtained an idea of the tremendous cubic-foot contents of the modern theatre.

DECEMBER 15, 1945—The construction work on the new balcony commences, of course, with the erection of the steel work, seen here (ten days after the previous pictures) well under way. Note that new steel columns have been established in the old wall for supporting the trusses that will sustain the new balcony.

JANUARY 21, 1946—In the balcony itself, a better report of progress is obtained. Here are seen the cement tiers on which the seats will be set, although the paper that covered the curing concrete is still cluttered about. Also better seen is the technique of suspending the scaffolding on which the ceiling makers are working.

JANUARY 21, 1946—Once the steel is in place, the construction goes on quite rapidly, and, in five week, despite the Christmas and New Year's slow-downs, the deep, discretely-slanted single balcony assumes a semblance of its final form. One set of stairs has already been poured, and the new ceiling is well under way.

JANUARY 23, 1946—In two days the new ceiling is in place and, discernible in the plan for the first time, is the projection room, set well above the ceiling level at the back of the balcony. The location of the projection booth requires a break in the even contour of the ceiling. Note the method of suspending the scaffolding.

FEBRUARY 7, 1946—The cement cured, and most of the debris of construction cleared away, the carpetmen move in. First is laid (extreme left of picture) the rug cushion that is essential to economical maintenance and long wear, with the actual carpet (note what will be the center aisle) being firmly attached to the floor.

FEBRUARY 9, 1946—Work of the carpetmen being done, work starts on the installation of the chairs, with the standards set up and the aisle lights connected. (Note the wiring outlets in the previous picture and the wired end standard at the right in this photograph.) At last, the balcony really begins to look like something!

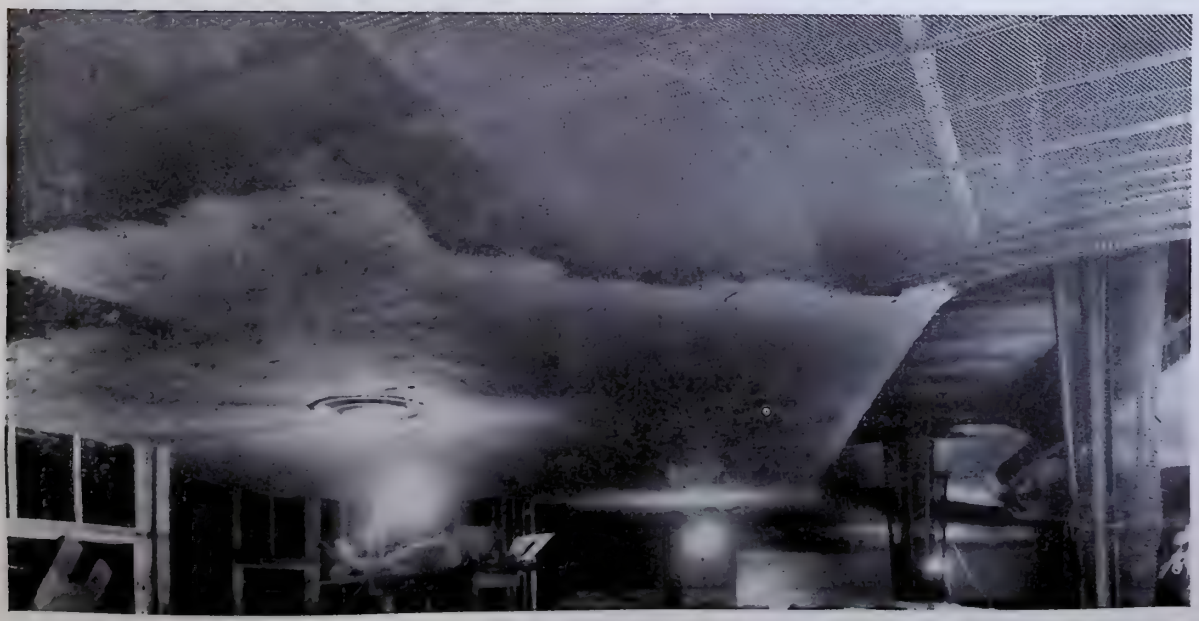
FEBRUARY 12, 1946—Only an audience is lacking to complete the job on the balcony of the New Theatre, and that was to come a short 24 hours later. Note how the projection room is set further back than might have been supposed at first glance. The exact location is perhaps better appreciated in the February 7 picture. Note that there are very few fixtured lights, and not too many downlights, but all are so designed as to give the right amount of light and to put it in the right places. Note, too, in these Hughes Company photographs, the improvement one balcony makes over what it was with two shelves.

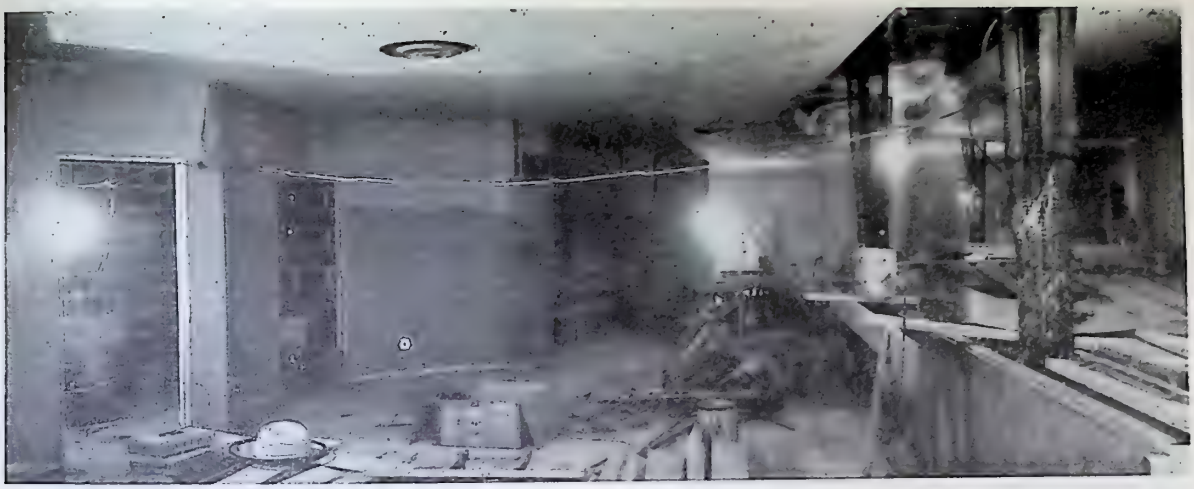
REBIRTH OF A THEATRE: THE MEZZANINE

JANUARY 21, 1946—Below the massive girders supporting the balcony (whose remodeling has been described, the mezzanine (left) starts to take shape. Because of the slope of the balcony, there will be a number of small rooms on this side of the area. Seen here are the initial stages of erecting the back wall.

JANUARY 28, 1946—In a week, the walls are erected and the great expanses of metal lathing has been set in place. The long, narrow opening in the ceiling will eventually become the round-ended recess from which light will flood the stairs and afford part of the general illumination for the mezzanine area. At this stage, however, only the cores of the two ornamental columns are in place, and what will become the fernery has not even been started. As the work progresses, the plastering will be laid on and the finish coats added to both the ceiling and the side walls. At the left can be seen the end of an air-conditioning outlet duct.

JANUARY 30, 1946—With all the lathing in place, and the ornamental columns shaped, the actual task of plastering is started with the ceiling. As will be noted in the following pictures (which are continued on the next page), the sequence of events is, in the main, first the rough base on the ceiling, then on the walls, and while the latter is being set, the finishing touches are given the ceiling. In this manner "something happens all the time" and no time is lost between one process and the next. Such economies of time and labor are especially desirable in a reconstruction job such as this at the New Theatre.





FEBRUARY 4, 1946—Over the weekend, the ceiling has been completed and the base layers applied to the walls and to the protecting wall at the edge of the stair well. But the ornamental pillars still remain to be done. However, the mezzanine area of the new New Theatre begins to take on the aspect of just that, and particularly can be seen the design of the light trough that will furnish much of the important safety lighting for the stairs. For ventilation of the area, ceiling air-diffusers have been installed so that the air conditioning of the area may be effected for the greatest comfort of the patrons at all times.

FEBRUARY 7, 1946—The plasterers' work is nearly completed, and before two days have passed, it will all be done. So nearly complete is the task that the clean-up job has begun, and when the ornamental columns and the stair-well barrier are done, the carpet men will move and start the beginning of the end.

FEBRUARY 9, 1946—The carpet cushions have been laid, and only the final details of the carpetmen need to be performed. The exit light fixtures have been set, and little remains now other than to call in the florist to equip the fernery that will add a pleasing solarium touch to the mezzanine promenade of the New Theatre.

FEBRUARY 12, 1946—The job completed, the mezzanine of the New Theatre is ready to receive its first audience, an audience that will be sure to mark with pleasure the unusual treatment of the stair-well barrier and of the light well above it. The idea of the fernery — in the theatre where artificial flowers are more the rule rather than the exception — is indeed laudable. The construction work herein depicted was performed under the most exacting conditions — of time, labor, and materials — by the Baltimore Contractors, and presented on this and the preceding page in photographs made by the Hughes Company.

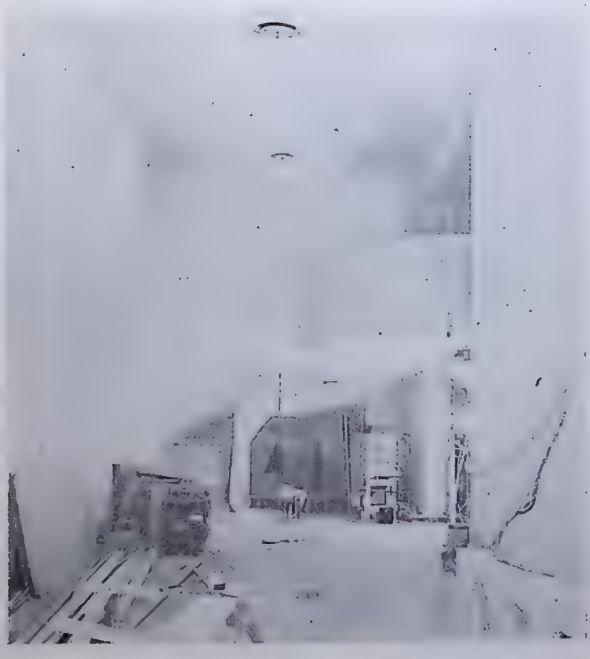
REBIRTH OF A THEATRE: MEZZANINE STAIRS

JANUARY 21, 1946—As the third week of the New Year started, work has already commenced on the task of finishing the stairs (upper left) to the mezzanine. The rough stairs are protected, and the studding for the new partition is in place. In a few days the lathing will be affixed and the plasterers start the base layers.

FEBRUARY 1, 1946—As the plastering gets under way on the stairway, other activity takes place nearer the entrance to the theatre (upper right), where the preparations of the new wall, with the spaces provided for what will later be the displays of the coming attractions and other announcements for clientele's edification.

FEBRUARY 4, 1946—The work has continued on the portion of the inner lobby and the stairs leading to the upper promenade (lower left), and workmen give final touches to the plastering. Their need now no longer urgent, the tables on which the architect's plans had been spread out (see first picture) have been removed.

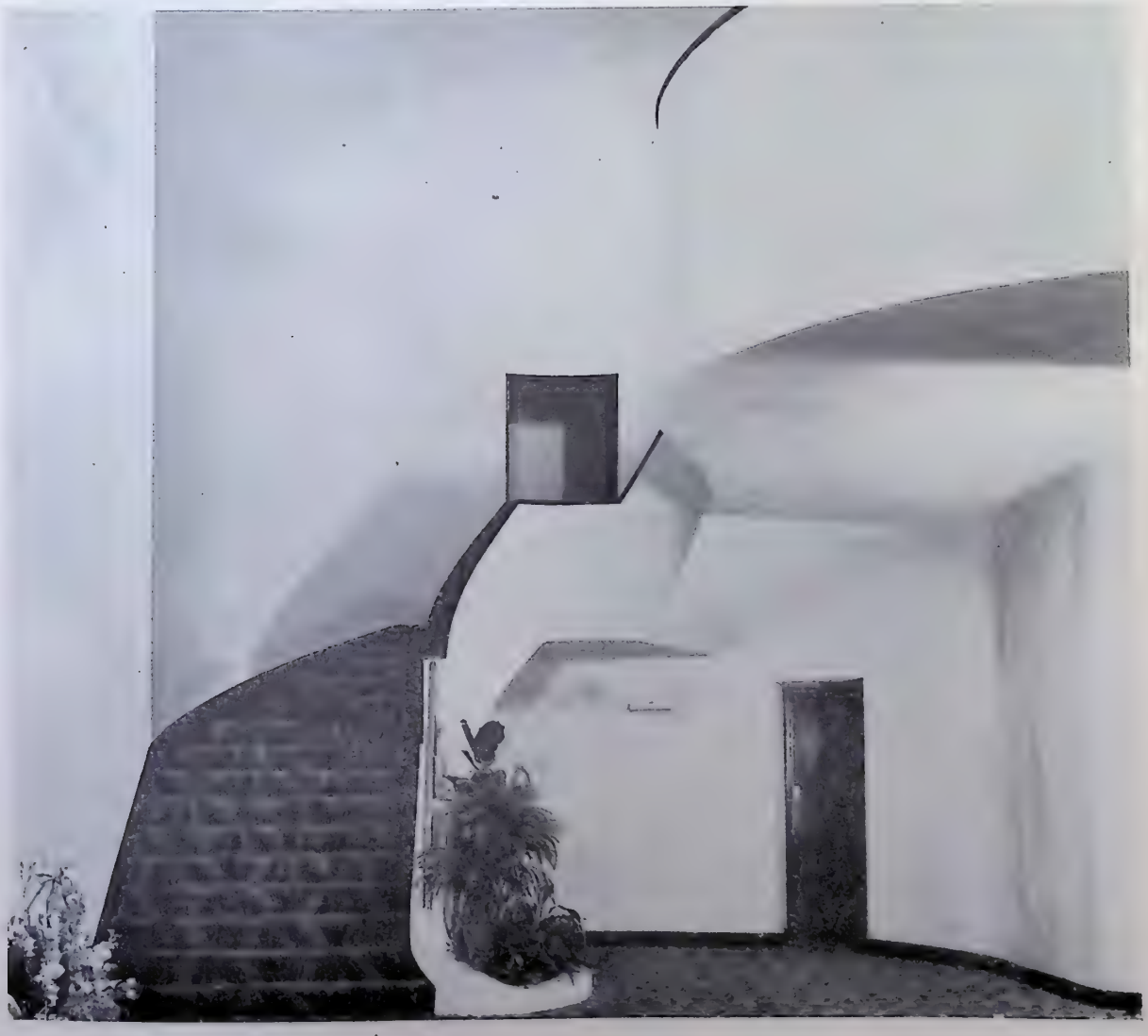
FEBRUARY 7, 1946—This is the beginning of the end (lower right), as it is concerned in the stairs end of the lobby, but not so further front, as will be seen in the pictures on the next page. But here the walls are finished and the area at the foot of the stairs is cleared to permit the carpenters to start on their work.



FEBRUARY 8, 1946—As indicated in the previous page, the outer portion of the lobby is far from completed, but admirable progress is being made. The base layers of the new walls are all applied, and some of the finish has been put in place. However, it will not be too long before even this portion is complete.

FEBRUARY 11, 1946—The final form of the lobby and the mezzanine staircase becomes apparent, as the workmen put on the final touches to the ceiling and walls. With the carpet lining laid down on the stairs and over the entire lobby area, the final laying of carpet starts first on the stairs, then on the level.

FEBRUARY 12, 1946—All done, and ready for the opening night's crowd of eager patrons—not to mention the invited guests—the area gleams in pristine splendor. The fernery on the left at the foot of the stairs is, for the incoming patron, the first floral touch that finds its culmination on the mezzanine, as was set forth in the two preceding pages, devoted to that part of the theatre. The flowers at the left in the picture are not part of the house fixtures, but a portion of the many congratulatory offerings received by the management of the new New Theatre. Hughes Company cameras caught eloquent simplicity.



JANUARY 26, 1946—First step in the delimiting of the standee area is the knocking of holes in the concrete floor marking the spots where the uprights will eventually be set. The process proceeds even before the ceiling and other parts of the area have even started to be finished, thus showing how, all through the process of rebuilding the various activities are telescoped so that the job will be completed on the date set by the contract. Here the start of the standee rails is seen, and the general method used to support them in the early stages of reconstruction of this very important part of well-designed theatres.

JANUARY 28, 1946—In two days the final supports of the two standee rails have been set in place, the temporary bracing removed and the cement base poured. As the work on the rails progress, so, too the work on the ceiling and walls advances, and it will not be long before the entire standee area starts to be recognizable.

REBIRTH OF A THEATRE: STANDEE SPACE

FEBRUARY 5, 1946—A week or so after the last picture, the ceiling plastering is practically completed, and considerable headway has been made on the walls. So, too, the work on the rails continued, and already some of the decorative paneling is being set in place, to be revealed better in the following pictures.

FEBRUARY 7, 1946—Paneling on the standee rails has been put in place, and the decorative top is being put in place. The plastering has been completed, and it will not now be long before the builder's equipment and the debris of construction is removed and the carpet men move in to put the final touches on the area.

FEBRUARY 11, 1946—With the completion of the walls, the lighting fixtures and wall plugs are set. In the meantime, the carpet men have moved in, laid the carpet lining and the final carpet. When the temporary electric cables are removed, and the ferneries planted, there will not be much left to do except to open.

FEBRUARY 13, 1946—In a little over two weeks, the standee area is all ready to receive the premiere audience—and the job of Baltimore Contractors is done. Note here, as in other sets of Hughes Company photographs presented in this series, the unusual effects of the mezzanine fernery and the "ivy bowl" near the top of the column shown in the background. The basketed flowers are not, of course, part of the regular decorative scheme, but congratulatory offerings from the management's well-wishers. Notable here, of course, is the use of a supplemental railing that sets off the rear cross-over.

JANUARY 21, 1946—The particular job in the rebuilding of the New Theatre that was really king-size was, of course, the auditorium. With all that has preceded in the other parts of the theatre, the situation here seems one almost impossible of satisfactory resolution. Actually, it is not so, as these Huges Company photographs will show. Here, indeed, everything seems to be happening at once: As the balcony is far advanced, workmen on the lower floor prepare to lay the concrete slab that will be the new auditorium floor. And even the ceiling men are not concerned with what is going on about them.

REBIRTH OF A THEATRE: THE AUDITORIUM

JANUARY 23, 1946—Not much has happened as meets the camera's eye in these two days, (left), yet where it is not so apparent progress is being made. The reinforcing steel for the floor is laid, preparatory to pouring the concrete. Progress is being made on the walls, so that very soon they will be all ready for the plasterers.

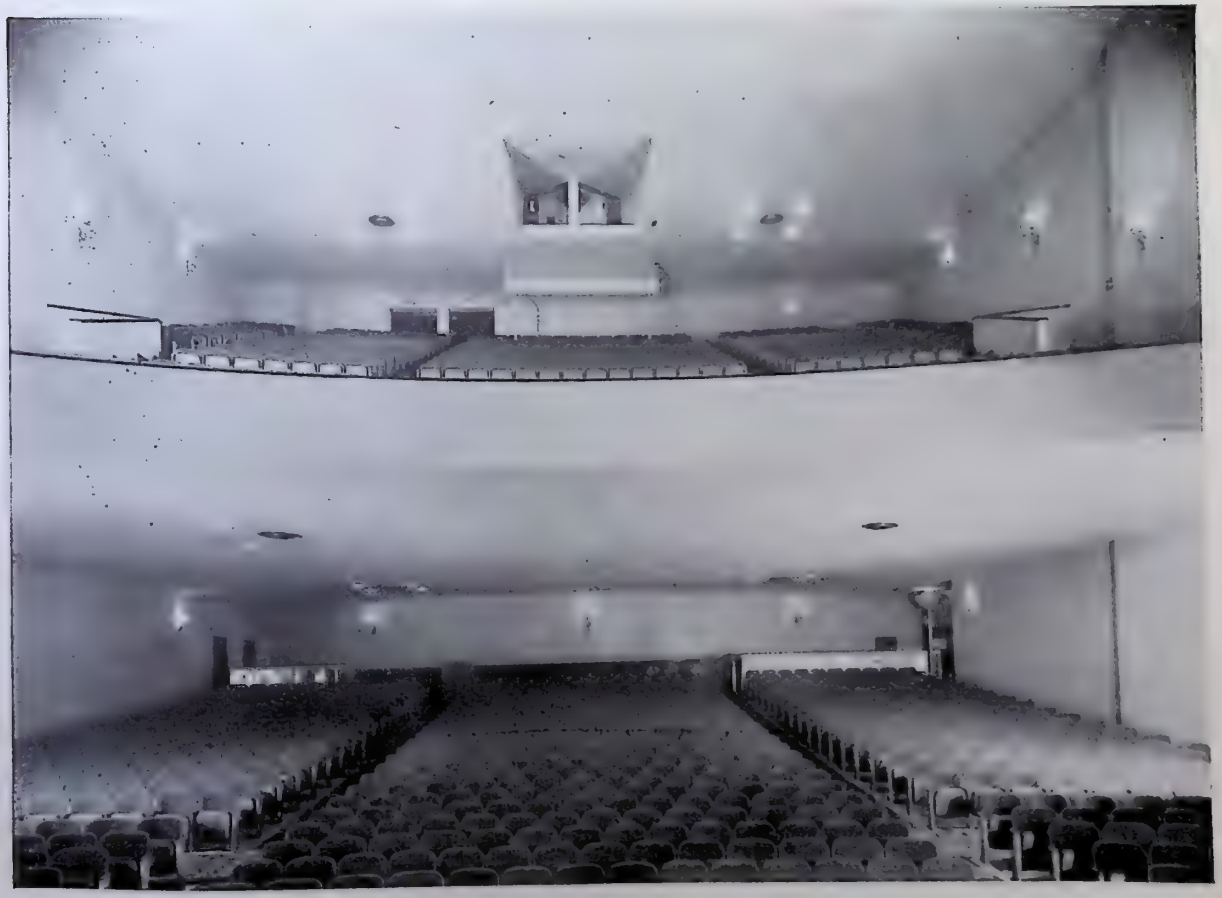
JANUARY 31, 1946—At the rear of the theatre further progress can be noted. The duct work for the air-conditioning system is in place, as also are the sheathed piping for the heating system. The workmen are also preparing for the final stages in building the ceiling of this portion of the auditorium under the balcony.

FEBRUARY 1, 1946—The ceiling of the auditorium proper is virtually completed, save for the final details of setting the light and air-diffuser fixtures. The ceiling of the portion of the auditorium under the balcony is lathed and ready for the plasterer. And now it will not be long before the staging is all removed.

FEBRUARY 9, 1946—With a great-plains expanse of floor space, the seat men are 'raring to go. In the balcony the standards are all set up, and on the lower floor many, although still cased, have been moved in. The extent of the rows of seats can be noted by the spacing of the end-standard-lighting floor outlets.

FEBRUARY 11, 1946—Although the balcony rail is stacked high with seating cases, they probably are empty, as the major job of seating the house, balcony as well as the lower floor, is virtually completed. The aisle carpeting has been laid, and even the final processes of cleaning up the debris have already been started.

FEBRUARY 13, 1946—The reconstruction work of Baltimore Contractors (who provided this illuminating series of pictures) is done and, in view of the vicissitudes of wartime, almost miracously. And here is the final theatre, modern, smart, and stark in its simplicity of line and decoration, transformed in every aspect of its former out-moded excellence of another era. As will be remembered, two balconies were formerly where this one "bigger and better" one now exists. Note the position and the architectural treatment of the projection booth and means taken for protection of patrons against spill of light.



FINALETTO. As one of the final operations, and the one most noticeable to the casual passerby, the building of the new marquee and sign brought the finishing touches to the new New Theatre. Here is how the construction looked on February 9, 1946, four days before the theatre was formally opened to the public. As the sign is turned on, the letters of the theatre name shine forth in "solid" tube light and seem to be rampant on a background of more tube lighting in contrasting color. The triangular marquee, projecting well over the sidewalk, is designed, lighted, and lettered as to be visible over great lengths of West Lexington Street.

The Use of the Quonset in Theatre Design

Full Description of Construction Methods And of Six Theatres Utilizing the Quonset

War, however it may be condemned on moral, ethical, and spiritual grounds, can be at least condoned—if not indeed be justified—for purely materialistic reasons. It is, of course, well known that many an advancement in the field of preventive, as well as curative, medicine has become desirable and forced into realization by the exigencies of war. And, as was so magnificently demonstrated in World War II, the material of peace can be converted to war, and, per corollary, the material of war can be converted, or reconverted, to the ways of peace.

Perhaps no better example of this reversible reaction can be cited than the case of Stran-Steel.

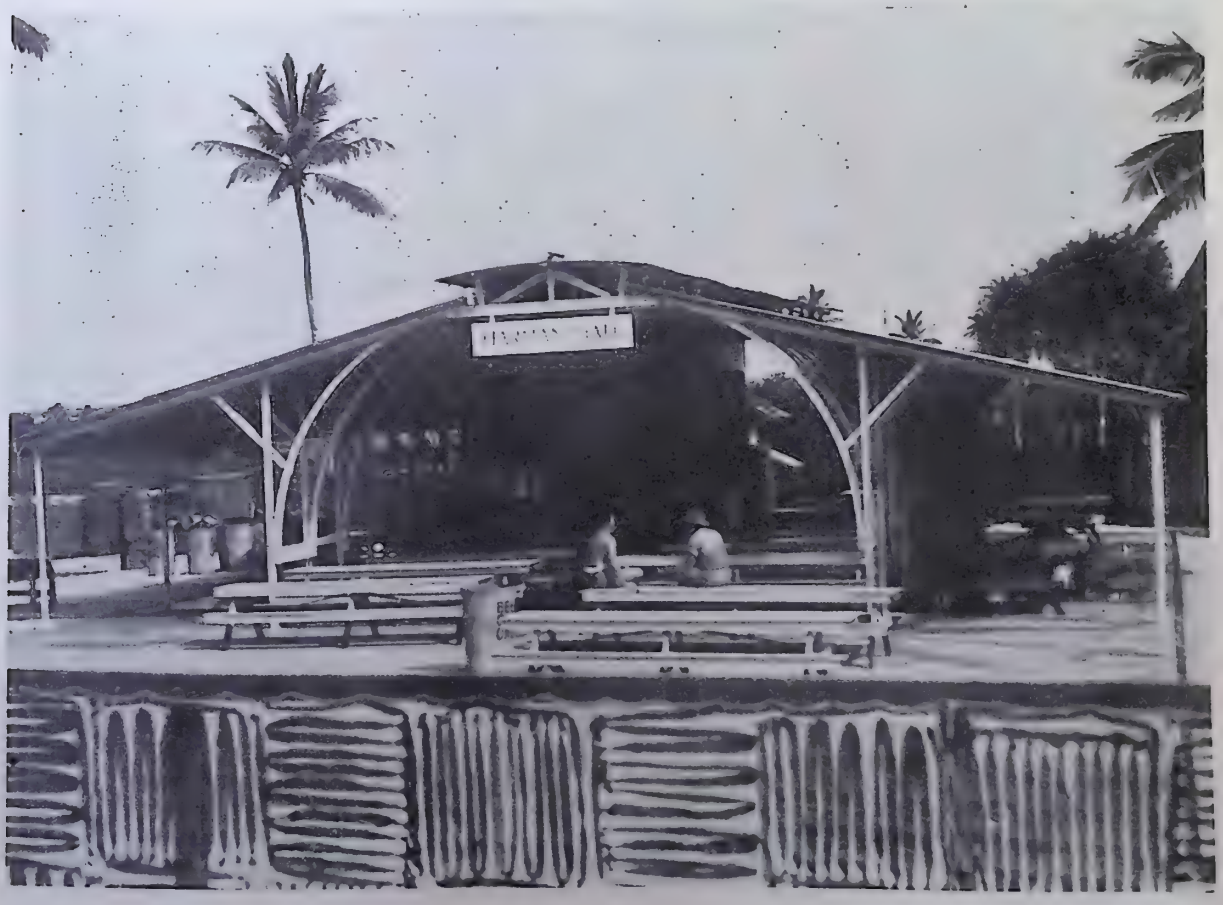
Some 15 years ago the Great Lakes Steel Corporation (a unit of the National Steel Corporation), through a division established for the purpose, developed, manufactured, and marketed a line of framing members, for use of homes and other types of light occupancy structures, the chief characteristic of which was a patented nailing groove, by which it was possible to nail surfacing material directly to the members. By manufacturing the various members according to a definite series of sizes and proportions, Stran-Steel became basically the pre-fabricated skeleton whose outward covering was wholly left to the customer's fancy.

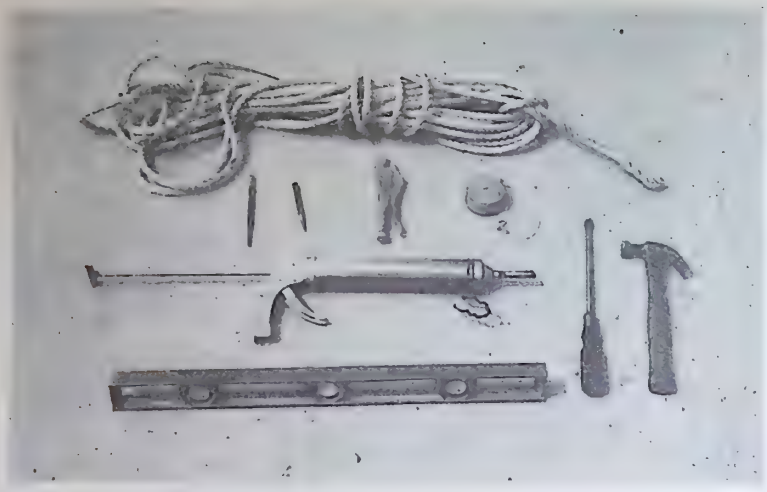
During the war, with the Armed Forces distributed all over the world, quite without regard to locally available materials for the erection of needed structures, the need developed for an easily made, easily shipped, and easily erected building that might serve a myriad of purposes. Into this breech stepped the Stran-Steel Division, devising out of its standard framing members a type of building that utilized an arch rib construction that could be erected virtually with nothing but a screwdriver and hammer! And the Quonset came into being.

Tens of thousands of Quonsets were used by the Armed Services all over the world for as many—and probably more—purposes as it is possible to imagine. So diverse were the uses to which the Quonsets were put in theatres of action that their potential service in a world at peace was soon apparent. When the war came to a close, the Stran-Steel Division sought to develop new uses for the war-proved Quonset.

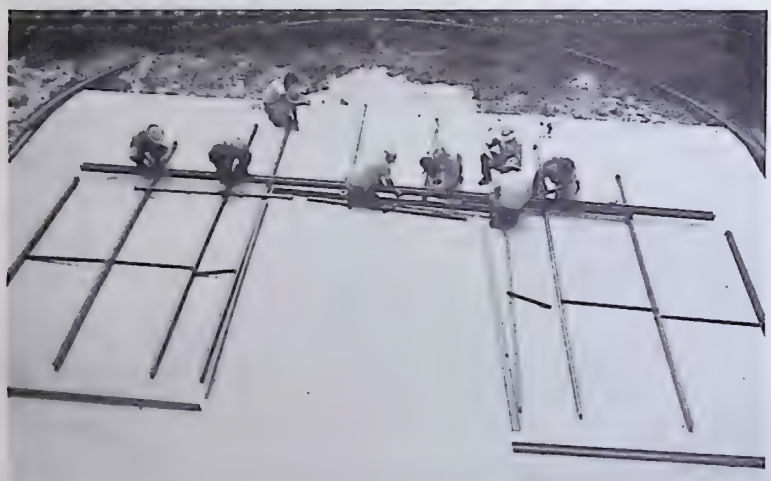
In some of the quieter sectors, these pre-fabricated huts had been used as theatres, and when Quonsets became available to the general public, architects started to use them, especially the

THE BIRTH OF AN IDEA. War won, Seabees still stationed on Guam turned their famed ingenuity loose for themselves. Starting out with standard Stran-Steel Quonset parts, the men who built this structure looking like an open-air vegetable stand, wound up with a recreation pavilion. The center section was formed by regular Quonset arch ribs, spread apart to the top by horizontal members. Lean-to roof stringers and columns are standard Stran-Steel beams, into which nails are driven. From this idea, together with variations on the theme, has unquestionably developed the present utilization of Quonsets for theatres. (U. S. Navy photograph.)





CONSTRUCTION OF QUONSETS, as will be revealed in the succeeding score of pictures, is simple and can be effected with a minimum of tools and these, as will be seen from the picture above, readily available to the ordinary carpenter or steel worker. Included in the requisites are rope, nail set and prick punch, clamp, chalk line, caulking gun, level, screwdriver, and hammer. The use of tools is revealed as the pictorial story unfolds.



ASSEMBLING WIND GIRT TO STUDS (middle) is the first step in the construction of a Quonset. Here are the preliminary stages in the formation of the front end. When the end section has been assembled on the ground—and the necessary staging erected—preparations are made (bottom) for raising it into position. Because of the lightness of the Stran-Steel fabrication, it is easy for four men to pull the section into position where it is braced.

40-foot-wide type for the auditorium portion of motion-picture theatres.

In the following pages is told the story of Stran-Steel, whose framing members *in status quo ante bellum* still find service in the theatre, of the Quonsets as buildings, and of these structures utilized in theatres. On the technical side, the Stran-Steel Division has been allowed to set forth its own story, while architects and theatre operators comment on the applications. From even a cursory examination of the material presented herein, it is apparent that here is a type of theatre construction ideally suited to the smaller communities where relatively inexpensive construction is of primary importance and yet in no way throttling the fancies of the owner, architect, and builder in creating a truly individual theatre.

For unstinted cooperation in providing material for this presentation, grateful thanks are extended to the Stran-Steel Division of the Great Lakes Steel Corporation (a unit of the National Steel Corporation), for providing descriptions of the products and their utilization and the series of progressive photographs of Quonset construction as well as supplementary material of some of the theatres; to Charles D. Strong, for the material on the Fox and Custer Theatres; and to DeHaven Pitts, of Smith-Pitts-Macpherson, for material on the It Theatre. Acknowledgment is also made of the cooperation of Edwin H. Wetherell and Willam J. Wagner, of Wetherell and Harrison, for material on the Mediapolis (Iowa) theatre; and of Morris Shulman, for material on the Gaiety Theatre.

STRAN-STEEL

Stran-Steel—What It Is

The distinctive feature of Stran-Steel is the "nailing groove"—an exclusive Stran-Steel patent. Because of it, fire-safe, economical, and permanent steel construction can now be applied to dwelling units and other types of light occupancy buildings. The nailing groove is found in all Stran-Steel joists and studs, which are made by welding two pieces of specially formed steel together. In the case of the stud, for example, two channel sections, specially formed, are welded back to back. The small space remaining between these pieces is just large enough to admit an ordinary nail. Driven in this groove, the nail is curved to the profile of the specially formed channels, and clinched in a grip of steel, utilizing to the utmost a holding power that cannot be duplicated with any other type of building materials. In this manner collateral materials are attached directly to the steel framework by the ordinary hammer-and-nails method.

Strip steel, from which all Stran-Steel members are formed, is produced in strip mills in the form of continuous coils, several thousand feet in length. Any specified thickness, or gauge, ranging from 1/32 inch (23 U. S. Standard Gauge) to 3/16 inch (7 U. S. Standard Gauge) can be produced by merely adjusting the rolls to suit the desired thickness.

With such a wide variety of thicknesses or gauges from which to choose, it is a simple matter for the architect or

engineer to hold the weight of members to a minimum consistent with load requirements. This saving in steel results in savings to the builder.

Any light occupancy building up to and including three stories in height can be economically framed in Stran-Steel—floors, roof, bearing and non-bearing walls and partitions.

Stran-Steel has been successfully used in residences, multiple dwellings, commercial and industrial buildings, over a period of 15 years, and in thousands of complete buildings which served America at war. Among the latter are the famous Stran-Steel framed arch-rib Quonset buildings in 20- and 40-foot widths, hangars, parachute lofts, and two-story arch-rib barracks buildings.

Framing Members

Typical Joist—Joists are manufactured in three depths—6, 8, and 9 inches—and in three gauges—16, 14, and 12. This member is used for floor joists and roof rafters.

Standard Stud—3⅝ inches in depth with a 2-inch flange. This member is used for framing both interior and exterior bearing walls up to three stories in height. Recommended spacing of Stran-Steel studding is 24 inches on centers. This member is also used for ceiling joists and roof rafters where span conditions are such as not to require deeper sections.

Narrow Stud—2-5/16 inches in depth, with 2-inch flange. This member is used for framing exterior walls up to two stories in height and interior bearing and non-bearing partitions. It is also used for ceiling joists having light loads. This member is adaptable as furring around ducts, pipe chases, and so forth, where nailing of collateral materials is required.

Half Stud—1-11/16 inches deep, with 2-inch flange. It is used as an auxiliary nailing piece to provide for nailing of collaterals where no great structural strength is required.

Standard Plate—3-13/16 inches wide, with 1⅝-inch flanges. This member is used with the 3⅝-inch stud section as a top and bottom plate and as a sill or head member for window and door openings where the nailing section is not required. Holes in the flanges are punched at 1-inch intervals for stud connections. Punching in web of channel for anchor bolts is at 6-inch intervals.

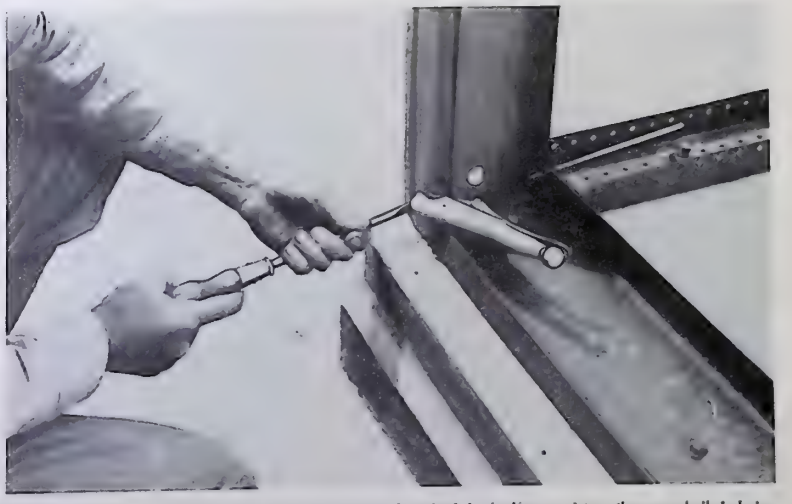
Narrow Plate—2½ inches wide, with 1⅝-inch flanges. This member, used with the narrow stud, is similar to the standard channel plate with similar punching.

Standard Punching for Pipe, Wiring Conduits, etc.—All Stran-Steel main members, except the half stud section, are factory punched in the webs. Holes are provided in the studding for the passage of conduits, pipes, and so forth. Joists and studs are punched on top and bottom flanges, with eight holes 13/64 inch in diameter, for placing of screws.

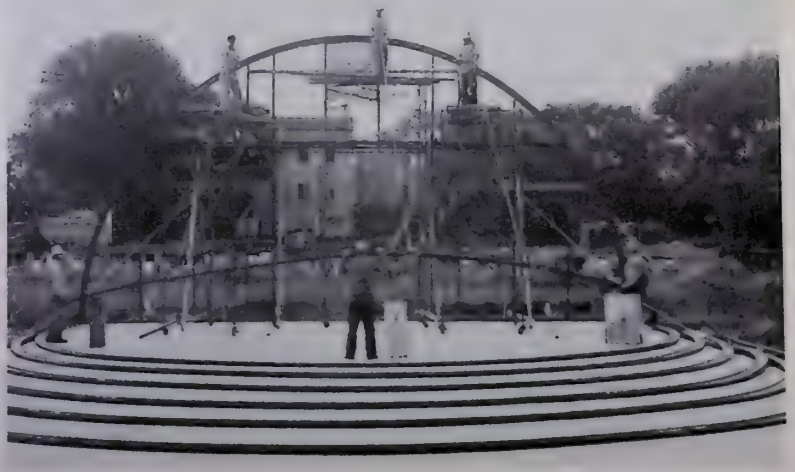
Finish—All Stran-Steel members and attachments are painted with a heavy coat of special rust-resisting paint. The protective coating is tough and very adhesive, will not chip, and resists scratching in handling and erection.

Standard Lengths—To 30 feet, inclusive.

ANOTHER METHOD OF RAISING THE END WALL is shown (top), utilizing a winch mounted in a truck. Note that the floor has already been laid, and the channel plates set in position. When the end wall frame is up, the first arch rib is drawn up into position and attached to the side-wall base channel plate (middle), according to the depicted method. Note how the clamp is used to hold the parts steady while the final bolting is accomplished.



ALL THE ARCH RIBS ARE LAID OUT in the order they are to be raised. In the bottom picture the second rib is being raised into position after which it will be firmly bolted to the side-wall channel plates and braced. The process will be repeated all along the line. The ribs on a 20-foot radius are set on 4-foot centers. The purlins, to which the roof covering is attached, are 2-5/15-inch nailable Stran-Steel sections screwed to the arch ribs.



ALIGNING THE HOLES in the purlin and the arch rib (above) with a screwdriver, and then clamped temporarily, the members are ready to be bolted together, as shown to better advantage in the middle picture. The nailing slot, the patented characteristic of Stran-Steel, is clearly seen in this picture, but will be described more in detail further on in this discussion. The temporary braces will be removed later on in the process of the Quonset's construction.

WITH SIX OF THE ARCH RIBS IN PLACE, and temporarily braced, the bracing of the first roof unit begins (below). The ribs are all alike, so that it makes no difference in what order they are set in place. These arch ribs are attached at their base to standard channel shape base plates, which are secured to the foundation. Purlins, to which the roof covering is attached, are of 2-5/16-inch nailable Stran-Steel sections screwed to the arch ribs.

Accessories—All necessary accessories for the proper erection of Stran-Steel are included with each job: bridging, joist hangers, C-clips, header brackets, corner brackets, stud brackets, half-stud trimmer, combination clip, rafter plates, hip and valley collars, rafter screws and bolts. All Stran-Steel parts and attachments are designed to develop full strength of connections.

Erection Methods

Stran-Steel framing is very simple to erect. The fact that all framing members are delivered to the job cut to exact lengths and completely fabricated, assures speedy erection. The following discussion deals mainly with Stran-Steel's system of light steel framing for homes, apartments, commercial buildings, and other types of light occupancy structures—while details of constructing the Quonset single arch-rib building is recounted in the series of 21 progressive photographs bordering these pages. Together these words and pictures give a complete picture of the fabrication of buildings utilizing Stran-Steel products.

In lower cost basementless construction, provision is made when pouring the first floor slab and foundation walls for anchoring the Stran-Steel plate by means of placing anchor bolts in the concrete or masonry at the required spacing, usually 4 feet on centers. Standard 13/16 inch holes are factory punched in the plates to receive the anchor bolts.

Where plates lap at the corners in basementless construction or where Stran-Steel first-floor joists are used, the plates are secured together with self-threading screws.

When a basement is used, Stran-Steel joists are erected in the conventional manner, spaced normally 24 inches on centers. When joists have been laid out over the basement area, a simple bridge type of lock-bridging is quickly installed. This bridging not only stiffens the floor construction, but, since it is precision-made, it maintains accurate joist spacing. Joists are bridged at intervals of not more than 7 feet.

Where joists lap over a central beam or where joists are doubled to support bearing partitions or for headers and trimmers. C-clips are hammered into the nailing grooves, firmly anchoring them together.

When the first-floor joists have been erected and bridged, a standard Stran-Steel plate is laid over the tops and screwed securely to receive wall studs.

Where first-floor joists are used on concrete walls, recommended practice is to fill in between joists with masonry on exterior and interior bearing walls. Care should be taken to see that joists are level before masonry work is applied. At this point a corrugated iron or light steel deck subfloor is nailed to the joists. This subfloor acts as an excellent working deck, while the rest of the frame is being erected. No time is lost waiting for the concrete floor to dry, as this is usually poured after the exterior sheathing has been applied. Such a subfloor provides fire safety over the basement at a minimum cost.

The next operation is the erection of the studding. Usually the loose studs are

laid on the subfloor and the top plate fastened. This simplifies the stud spacing (normally 2 feet on centers), since both top and bottom plates may be marked for stud centering simultaneously. With the top plate fastened, the wall is raised, set into the bottom plate, and secured with screws.

Second floor joists are erected and secured to the first story bearing stud plates in a manner similar to the construction of the first story floor, and second story walls and partitions proceed as described for first-story walls and partitions.

The roof framing may be effectively done in one of two ways. On buildings with long roofs—such as apartments, schools, hospitals, and the like—or on projects with considerable duplications, welded roof trusses are most economical. On single dwellings and on complicated roof framing, it is generally more practical to use the standard rafters erected individually.

Trusses provide a clear span up to about 36 feet. Two men can erect them, since they weigh but from 60 to 90 pounds each. Normally they are spaced like the joists and studs, on 2-foot centers.

Trusses are obtainable as units, prefabricated before delivery, or they can be site-assembled and welded from precut members on a simple jig table. Temporary bracing is used. Care should be taken that all steel work is level and plumb before applying collateral materials

Collateral materials, both inside and out, are nailed directly to the Stran-Steel studding, joists, and rafters. When fire-resisting collateral materials are selected, as economical fire-proof construction results. Any collateral material applicable to wood framing can be used with Stran-Steel framing—finishes both for outside and inside may be identical.

QUONSET BUILDINGS

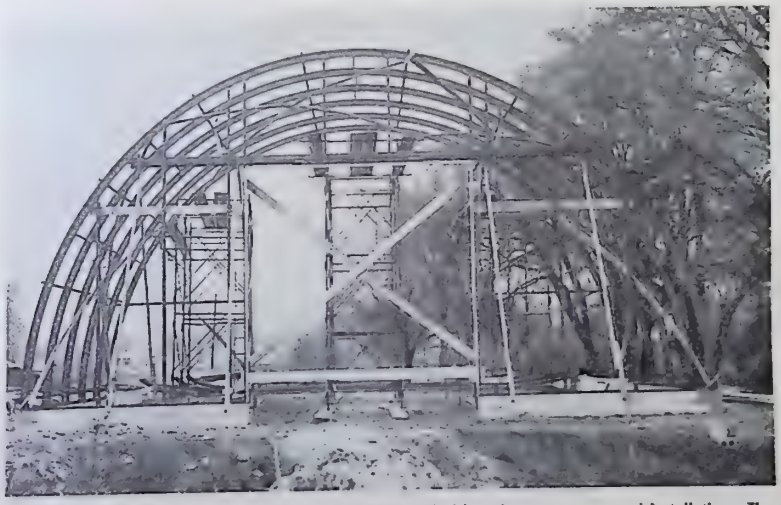
Manufactured in the tens of thousands, the famous Stran-Steel Quonset buildings served America at war on military bases everywhere, furnishing vitally needed protection and comfort to our fighting men

Now, Quonset buildings are going into the service of America at peace—complete, all-steel buildings of many uses.

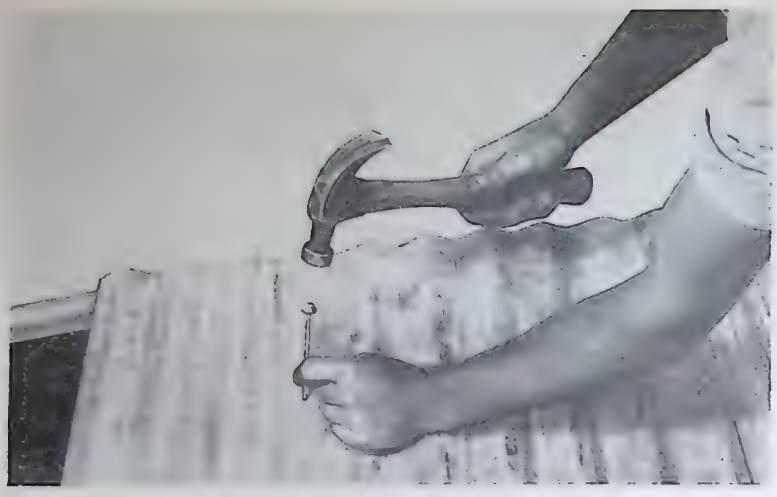
Secret of the ease of erection, demountability, and portability of Quonset buildings is the light weight of the steel framing members, the fact that they can be assembled with sheet metal screws, and the nailing groove, an exclusive Stran-Steel patent, found in all Stran-Steel curved ribs, purlins, studs, and trimmers. Through the medium of this nailing groove, other building materials, including inside and outside covering, can be nailed directly to the Stran-Steel frame.

The standard Quonset 20 is a clear-span building, 20-feet wide, and as long as wanted, increments of 12 feet—24, 36, 48, 60 feet, and so on—with a walk door, and two windows and a ventilating louver in each standard end wall. Through the adaptability of the Stran-Steel framing system, it is a simple matter to provide additional windows on

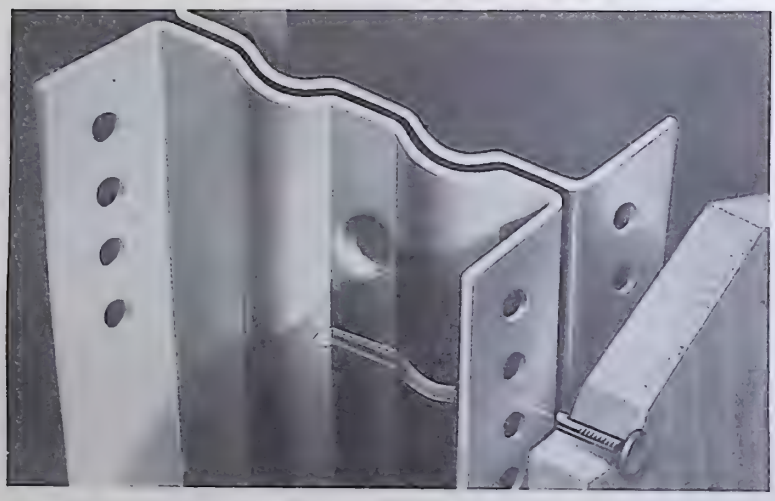
THE FRAMING OPERATIONS are shown in the top picture. The miscellaneous materials—such as foundation anchor bolts, screws, bolts, nuts, washers, clips, and the like—are furnished as required for the complete erection of the structure. All steel—including arch ribs, purlins, girts, sheet covering, and miscellaneous parts— are of first quality, full weight and gauge, in accordance with manufacturer's standards. All parts are accurately cut at the factory.



PROPER BRACING of the first roof unit and end wall is accomplished by using temporary wood installations. The middle picture shows the bracing looking toward the front of the structure, while the bottom photograph shows more of the framing operation, the tenth arch rib in the process of being raised into position. Already the structure to be is 40 feet long; and, when this arch is set, the length will have been increased by another 4 feet.



THE COVERING STARTS when the ribs are all up and all the purlins in place. The top picture shows the driving of Filshie nail to attach the covering material. To reveal how it is possible to "nail to steel," the phantom picture (middle) shows the patented Stran-Steel groove. As the nail is driven into the nailing groove, it is deformed and clinched between the jaws of the Stran-Steel member, utilizing a holding power that can not be duplicated.



THE COVERING SHEETS pulled to the top of the building and fastened by being nailed to the patented groove, the overlapping edges are caulked to seal out the weather (bottom). The covering material is corrugated sheets, bright galvanized, easily attached to the Stran-Steel framework without need of furring strips, simply by nailing into the framing members. Sheets used on the arch rib portion are shop-curved to conform to building contours.

the sides, ventilating equipment, or interior insulation. Standard end walls, without openings or with a door approximately 7 feet wide, are also available.

Quonsets 24's are 24 feet wide, and are supplied in 12-foot lengths, or in multiples of 12 feet (12, 24, 36, 48 feet, and so forth); structures with sliding doors are supplied in 24-foot lengths, with as many 12-foot extensions as desired. Inside steel partitions are available to enclose any 12-foot section. Solid end walls are standard but walk doors and windows to meet special requirements are available at slight extra cost. The exterior is galvanized corrugated steel.

The Quonset 40 is a Stran-Steel arch rib building—standardized at 40 feet wide, but available in any length in increments of 20 feet. Roomy, quick to erect, durable, it provides an ideal answer to the need for space at an economical price. It can be easly expanded by adding additional 20-foot sections.

With the Quonset 40, here is also space that can be expanded to any width in multiples of 20 feet 6 inches and, of course, any length in multiples of 20 feet. Adapted from the standard 40 by 100-foot building, it offers a quick answer to immediate warehouse, storage, or manufacturing needs.

THE QUONSET 40

While the Quonset 20 and the Quonset 24 have their special field for service, it is the Quonset 40—and especially in the 100-foot length—that has been adopted as more or less standard for the construction of theatre auditoriums, since about 600 seats can be installed.

Quonset 40 buildings are made in two types, namely Type A and Type B. The two types are identical except for purlin spacing and bridging. The Quonset 20 buildings are made in only one type, as described above.

The Type A Quonset building has 10 rows of purlins, whereas the Type B Quonset 40 building has 19 rows of purlins. Because of the wider purlin spacing used in the Type A building, five lines of bridging are installed midway between purlins to prevent lateral movement of the arch ribs.

Lateral movement of the arch ribs in the Type B Quonset building is prevented by attaching 1½ by 14-inch gauge strips to purlins and arch ribs at their intersection. This Type B building is recommended for occupancy structures.

Specifications

Before entering into a discussion of the use of Quonsets as theatres, it might be well to look into the specifications for the 40-foot, arch rib building. The following paragraphs are, then, a condensed version for the Quonset 40.

Arch Rib Framework of the 40-foot clear span consists of 6-inch deep Stran-Steel joists, curved to an inside radius of 20 feet, and spaced 4 feet on centers throughout the length of the structure. These arch ribs are attached at their base to standard channel shape base plates which are secured to the foundation. Ribs are all alike, simplifying erection procedure. Purlins to which roof covering is attached are of 2-5/16 nailable Stran-Steel sections screwed to the arch ribs.

End Walls are framed with 3⅝-inch Stran-Steel studs, spaced at approximately 4 feet on centers. Studs are securely connected to channel base plate at the bottom and to the end arch rib of the building at the top. The wind girt, that extends for the full width of the building at a point slightly above the top of the door, serves to support the door track. Door headers and jambs consist of channel plates.

Covering Material is corrugated sheets, bright galvanized, easily attached to the Stran-Steel framework without the need of furring strips, simply by nailing into the framing members. Since inside faces of ribs are also provided with the Stran-Steel nailing groove, interior lining or insulating board can be easly attached. Sheets used on the arch rib portion of the building are shop-curved to conform to the building contour and are all alike, making application simple and speedy.

Steel Door, approximately 12 by 12 feet, of the double inside sliding type, complete with frame, track, and hardware, are available for installation in the middle of each end wall.

Steel Windows, approximately 3 feet 4⅞ inches by 4 feet 1 inch, of the commercial projected type, top hung, complete with frame and flashing are available for installation in 4-foot spaces between studs on the end wall, or between the ribs on the side wall. Four windows, two on each side of the door, are standard for the end wall. Side wall windows can be ordered in the quantity required.

Louvers, adjustable, approximately 3 feet 8 inches by 3 feet 9 inches, complete with frame, pull bars, chain, and flashing, are available for installation in the center 4-foot stud space over the door in the end wall.

Miscellaneous Materials, such as foundation anchor bolts, screws, bolts, nuts, washers, nails, clips, and the like, are furnished as required for complete erection of the structure. All steel—including arch ribs, studs, purlins, sheet covering, and miscellaneous parts are first quality, full weight and gauge, in accordance with the manufacturer's standard practice. All framing members receive one shop coat of rust-resisting paint. All parts are accurately cut and punched for easy field assembly without the use of special equipment, and are clearly marked for immediate erection.

Quonset Costs

As of January 2, 1947, the following unit prices of the Quonset 40, Type B, were in force—f.o.b. the plant in Ecorse, Michigan—by the Stran-Steel Division of the Great Lakes Steel Corporation:

Length (in feet)	Price (per unit)
40	$2,198
60	2,799
80	3,400
100	4,001
120	4,603
140	5,204
160	5,805
180	6,406
200	7,008

These buildings include two end walls, each with one 14 by 13½-foot door, four 3-foot 4⅞-inch by 4-foot 1-inch windows,

CURVED FLASHING is set in place to protect the corners from the weather (top). As each succeeding course of the galvanized covering sheet is set in place (middle) the inside edge of the sheet is given over its full length a squirt of the caulking compound to make a weather-proof seal. The sheets used on the arch rib portion of the Quonset are shop-curved to conform to the building contour, and are all alike, making application simple and speedy.

DETAIL OF THE APPLICATION of mastic to the head and side laps of the sheathing is shown in the bottom picture. The mastic is applied so as to give the galvanized covering a weather-tight seal. This method of construction is, in general, followed when Quonsets are utilized for theatres although, of course, the thermal and sound insulation necessary is added independent of the Quonset as these are manufactured and sold by the Stran-Steel Division.

THE TOP COURSE OF SHEETS is, of course, installed last (top). After caulking the edges of the previous laid-down sheets, the top one is set in place and fastened to the framework, as is shown in the middle picture, where the stitch screws are being installed in the sheathing. Seen here is the rear end of the structure, showing the ventilation louvers in place. This item is not, of course, generally used when the Quonset is utilized in a theatre auditorium.

AMONG THE LAST THINGS to be done is the installation of asphalt strips at the door jambs (bottom), to seal out the weather. Construction of Quonsets as set forth in these Great Lakes Steel Corporation pictures are, of course, for non-theatre purposes, but the general idea is the same. In theatre construction, a great deal more has to be done, things which would have to be done regardless of the way the architect decided to build the auditorium.

and one 3-foot 8-inch by 3-foot 9-inch louver.

From the same consumer price list came the following unit prices from other items:

Solid end wall	$315.00
End wall, with 14 by 13½-foot door, four windows, and one louver	485.62
Side wall window and frame	26.91
20-inch roof ventilator	25.65
12 by 12-foot door assembly	293.48
Package of nine purlins	45.90

The company points out that no insulation, interior finish, sidewall doors, floors, electrical material, erection tools, or erection service of any kind are included in these prices. Also, the prices do not include any sales, use, or similar taxes which may be applicable to this type of material or on its sale. Any such taxes will be added to the sales price, and are to be paid by the purchaser.

The company reserves the right to accept or reject orders at discretion.

QUONSET THEATRE DESIGN

The Quonset structure, that developed during the war, is particularly adapted to the design of the small theatre.* It is a building semicircular in cross-section, 40 feet inside diameter. It comes prefabricated, and is easily and quickly assembled on the job. Structurally it consists of vertical semicircular ribs, four feet on centers, with horizontal purlins connecting these ribs. Over these purlins is an outer shell of galvanized iron corrugated sheets, curved to the radius of the building. The smallest building unit of this type is 40 feet long and additional sections come in units of twenty feet. With each building unit there are two end closure sections.

It may be used in theatre design in a number of different ways. The front portion of the theatre, as in the Fox Theatre, Aurora, Colorado, may be of other materials, working from a stadium type plan; or, as in a proposed building in South Dakota, the entire structure may be Quonset type, except for a brick closure wall across the front.

Structurally, the vertical ribs are erected on a steel channel, which comes with the building, and which is bolted to the top of the concrete foundation wall. This foundation wall may, as in a design embodying the stadium type, be carried above the grade level to give additional height in the building, or in a single floor type, be but six inches above grade. The curved nature of the roof structure on this building necessitates the provision of a sheet metal flashing at the bottom of the corrugated sheets so as to throw the water away from the wall, and a concrete ribbon at least thirty inches wide along the wall, so as to prevent the water pouring off the circular roof from causing settlement of the soil adjacent to the building. Needless to say, it is absolutely essential to provide waterproofing of exterior concrete walls where the floor of auditorium is below grade level.

*Out of his experience with the Fox Theatre, Aurora, Colorado, and the Custer Theatre, Custer, South Dakota, both of which are presented in pictorial detail further on in this article, Charles D. Strong, Denver architect, graciously contributed this section.

In order to provide insulation against heat and cold, as well as to provide deadening against outside noise, such as rain, hail, etc., two layers of blanket type insulation have been used; one layer directly on top of the purlins under the corrugated roofing, the other on the inside of the purlins. The inside of the building may be finished with plaster on metal lath, acoustical plaster on metal lath, sprayed-on acoustical materials, such as Limpet asbestos on metal lath, or acoustical boards or tiles fastened to the inside of the ribs or to furring strips.

As in all theatre interiors, it would be well to provide a wainscot at least six feet above the floor of Keene's Cement, or other hard material, before starting the use of acoustical material.

Another thing to guard against is the provision of too large a sound-deadening area, tending to muffle the sound from the horns back of the screen.

Some plaster surfaces extending from front to rear are essential to carry the sound to the back of the theatre.

Because this is an all metal structure, it is essential that some provision be made for lightning protection, and the burial of lengths of copper wire attached to the metal framework at the four corners of the building should be sufficient to give this protection.

In heating and ventilating a structure of this type, the fan and boiler room can be provided by erecting a partition some twelve feet ahead of the rear wall. This serves as the wall of the boiler room and fan room and the rear wall of the stage.

The end section usually comes provided with a 14 by 14-foot door opening, and this door is fastened permanently in place after the top has been cut down sufficiently to provide for fresh air intake louvers.

This end section is the weakest point structurally of the building, and it is necessary to provide structural steel to brace it. This steel can be used as an integral part of the necessary fan platforms for both supply and exhaust fans. If natural gas is available for a gas-fired boiler installation, a sheet metal stack can be used, made up with an inner and outer section; the inner section of aluminum as being less subject to the corrosive action of the gases.

Provision for heating and ventilating can be made by carrying a supply duct down the ceiling of the auditorium with air-diffusion outlets, and return and exhaust air grilles into sidewall ducts. In smaller theatres, it is perfectly feasible to supply air to the auditorium from grilles on each side of the proscenium, with exhaust grilles on each side of the projection room leading to a fan at the street end, such return air circulation as is needed being provided entirely through grilles in the steps to the stage.

The floor is normally of concrete, the seating on a radius with a slope to the stage from the rear. Using two 4-foot aisles, there are eighteen 20-inch seats in each row.

Lighting can be provided in a number of ways: by back lighting the proscenium arch with neon tubing, by neon tubing in a trough from front to back parallel to the overhead supply ducts, by lowered recessed projector units in the side walls, by overhead spots and floods, by aisle lighting in the end seats of alternate rows of seats, or by reverse cove lighting with neon tubing at rear.

Light reflection on the curved surface is excellent, the danger is in securing too much light rather than too little.

The initial manufacture of this type of structure was, of course, entirely for use during the war. To date, no material refinements have been introduced to broaden its utility for peacetime purposes. Its adaptability, therefore, introduces interesting speculations as to the future of prefabricated structures designed specifically for such uses.

At any rate, at the present time, during this period of material scarcity, it provides the medium through which a structure can be secured and erected more quickly than one built of conventional materials.

A structure that in every part of the world has stood the rigors of the most diverse climatic conditions, the Quonset gives promise of having at least as long and useful a life as other type structures used for theatrical purposes.

THE QUONSET 40 COMPLETED, the all-steel building that now bows to the theatre world as the answer to the question of low-price theatres for localities where a nice, modern cinema would be welcomed were it not for the initial investment occasioned by the usual construction procedures. And there are no brakes on theatre architect's imagination. In the following pages are pictures and drawings of what has been accomplished in theatres.

THE FOX THEATRE, AURORA, COLORADO

Fox Inter-Mountain Theatres, Inc., Owner — **Charles D. Strong, Architect**

CHARLES D. STRONG
Architect

The Fox Theatre in Aurora (suburb of Denver), Colorado, is a 650-seat, of stadium type, combination masonry and Quonset construction.

The front portion is masonry to the marquee, which is continuous across the front and down the sides, and above has a semicircular metal frame consisting of the Quonset ribs set horizontally, fastened to upright structural steel, faced on the exterior with corrugated aluminum. Above the marquee are two display frames, back to back, above which to a height of 65 feet above the sidewalk rises a vertical sheet metal sign.

The lower portion of the front under the marquee is faced with a structural tile cream base with cream structural glass above to the underside of the display frame under the marquee ceiling. The material on the sides is a kiln run red brick above the tile base. The face of the marquee is faced with the structural glass. The ceiling of marquee is plaster on metal lath.

In the rear of this masonry portion is the Quonset structure resting on a concrete foundation wall three feet above grade.

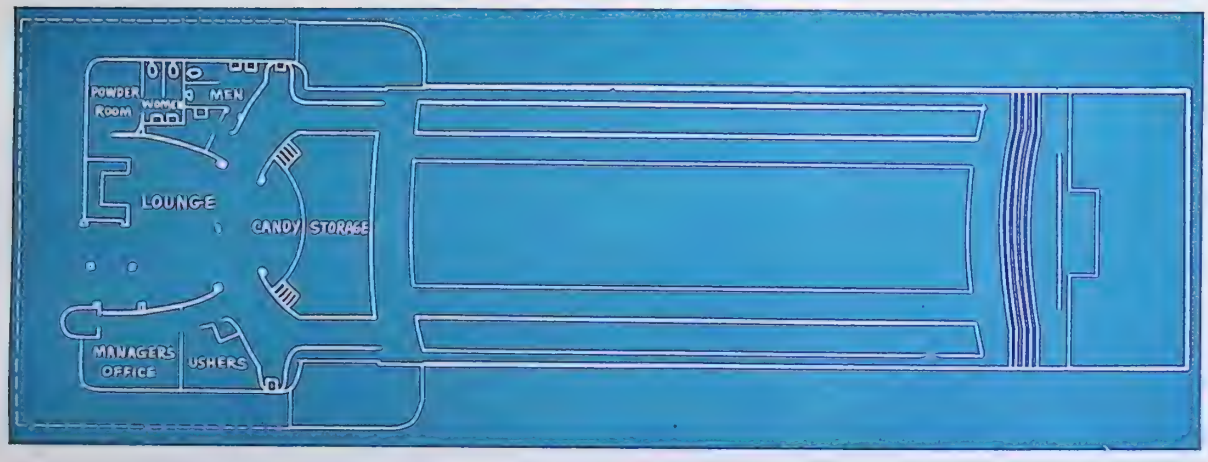
The front masonry portion contains the lounge, manager's office, box office, rest rooms, ushers' room, janitor's closet, concession space, and storage under the stadium section.

The lounge occupies the central portion of the front with four 3-foot doors giving admission from the street. The walls of the lounge adjacent to the theatre area are curved. The entrance doors from a vestibule entrance projecting into the lounge. On the street face, a large picture window provides light and a view of the interior. A wide cove carries three neon tubes; white, rose and blue, around the edge of the bowl ceiling. The walls are plastered above a tile base. The floor is carpeted.

The concrete vestibule floor and the sidewalk in front are colored a quarry red.

Facing the building on the right of the lounge is the manager's office, and opening from this office, facing the

THE FLOOR PLANS of the Fox Theatre, Aurora, Colorado, reveal the compact and efficient arrangement of the various parts of the theatre. The front portion contains the lounge, manager's office, box office, rest rooms, ushers' room, janitor's closet, concession space, and, under the stadium portion, storage space. The lounge occupies the central portion of the front, with four 3-foot doors giving admission from the street. On the left of the lounge is the ladies' powder room, against the front wall. Back of this is the men's rest room with opening from the the auditorium's left entrance ramp. Under the stadium there is the concession area.



street, the box office. The manager's office has plate-glass windows with draw curtains, facing into the lounge and the vestibule. The sides and front of box office are plate glass with aluminum exterior facing below shelf and stainless steel facing of toe space. The floors of manager's office and box office are covered with asphalt tile.

The passage to manager's office runs from entrance ramp to auditorium with ushers' room and telephone booth opening off passage. This passage is carpeted. Lighting in this section is by means of fluorescent tube fixtures.

On the left of the lounge is the ladies' powder room, against the front wall, with shelf of black structural glass, mirrors above and fluorescent light units in shelf. Walls are papered with striped design, but on diagonally above tile base. Floor is carpeted. Adjacent to this is the women's toilet with tile floor and 6-foot tile wainscot. Back of this is the men's toilet with opening from the left entrance ramp to auditorium, tiled in the same manner as the women's toilet. Both rooms have light fixtures containing bacteria destroying units.

At the back of the lounge between the entrance ramps to auditorium, under the stadium, with curved band shell type walls and ceiling, is the concession area where are the cases for the display and sale of candy, popcorn and ice cream sandwiches. This area is back-lighted by a reverse cove containing neon tubing and by spots on the under side of cove. Back of these units is a storage space accessible from doors at each side.

Ramp leading from each side of the lounge to the auditorium crossover are carpeted, have side wall fluorescent tube lighting with louvers, and have drinking fountain niches with back-lighted vertical louverex panels above fountains.

Stadium section of auditorium is built up of structural steel with steps of steel plates and angles and colored concrete slab over rib lath. Steps are 36 inches wide and 12 inches high. Rear wall of stadium curves as it is inner section of upper semicircular front portion. Projection booth has curved front, curving into stadium area. Ceiling over stadium beyond Quonset section is flat, plastered on metal lath. Side walls are furred out, metal lath on channels, with Keene cement wainscot 5 feet high running around face of projection booth. Between wainscot and ceiling, lath is sprayed with ¾-inch Limpet asbestos. Inside of booth walls and ceiling are soundproofed with Limpet asbestos. Front wall of booth is solid plaster, metal lath on channels.

Concrete step slabs curve up at intersection with carpet so as to avoid differential in height between step slab and carpet.

The stadium is raised above crossover level 2 feet, with plaster rail 2 feet, 6 inches high surmounted by stainless steel flat bar railing in front and around walls of ramp wells. Steps to stadium are side lighted by recessed fluorescent tube fixtures with louvered face. Rear wall around projection booth has thin cove containing single blue neon tube running light.

Crossover has exit doors in each side wall. Floor of auditorium is bowled to stage from crossover of colored concrete. Return and exhaust air ducts are built into side walls back of vertical wall surface composed of plaster on metal lath and channels, which intersects inner curve of Quonset about seven feet above floor at crossover.

Down center of Quonset ceiling is flat plaster surface under supply duct about seventeen feet in width, with cove on both sides below ceiling. Between wainscot and this cove, interior curved ceiling wall is sprayed with Limpet Asbestos.

Front of stage has curved steps from auditorium floor which steps extend to side wall and provide access to exit doors

on each side of proscenium, which provide entrance to small vestibules from which exterior exit doors, doors to boiler room and storage space in rear of stage, and doors to stage open.

Proscenium is built up of plywood with openings above exit doors, across which stage curtains are draped. Stage exit doors have curtains on pull cords. There is a gold sliding curtain on track in front of screen and rose drapes on each side. Drapes follow curve of ceiling. Crossover aisles and stage steps are carpeted.

Lighting is provided by gold neon tubing back of proscenium lighting drapes, by overhead floods lighting stage, by overhead recessed spots in flat plastered center portion of ceiling and by louvered recessed units in side walls. Ceiling units have yellow and sidewall units have blue filter plates.

Seats have red seat and back, sidewall wainscot is light green, flat portion of ceiling is light green, Limpet asbestos is brown. Decoration on sidewalls and ceiling is oil paint in foliated design. The air diffusers in the ceiling are of aluminum.

Back of stage on right is boiler and fan room containing vertical steel steam boiler, supply fan, exhaust fan and washer, together with pumps and compressor unit. On left is storage room.

Light and power panels are in boiler room. Johnson Service controls operate heating and ventilating units and are operated from manager's office.

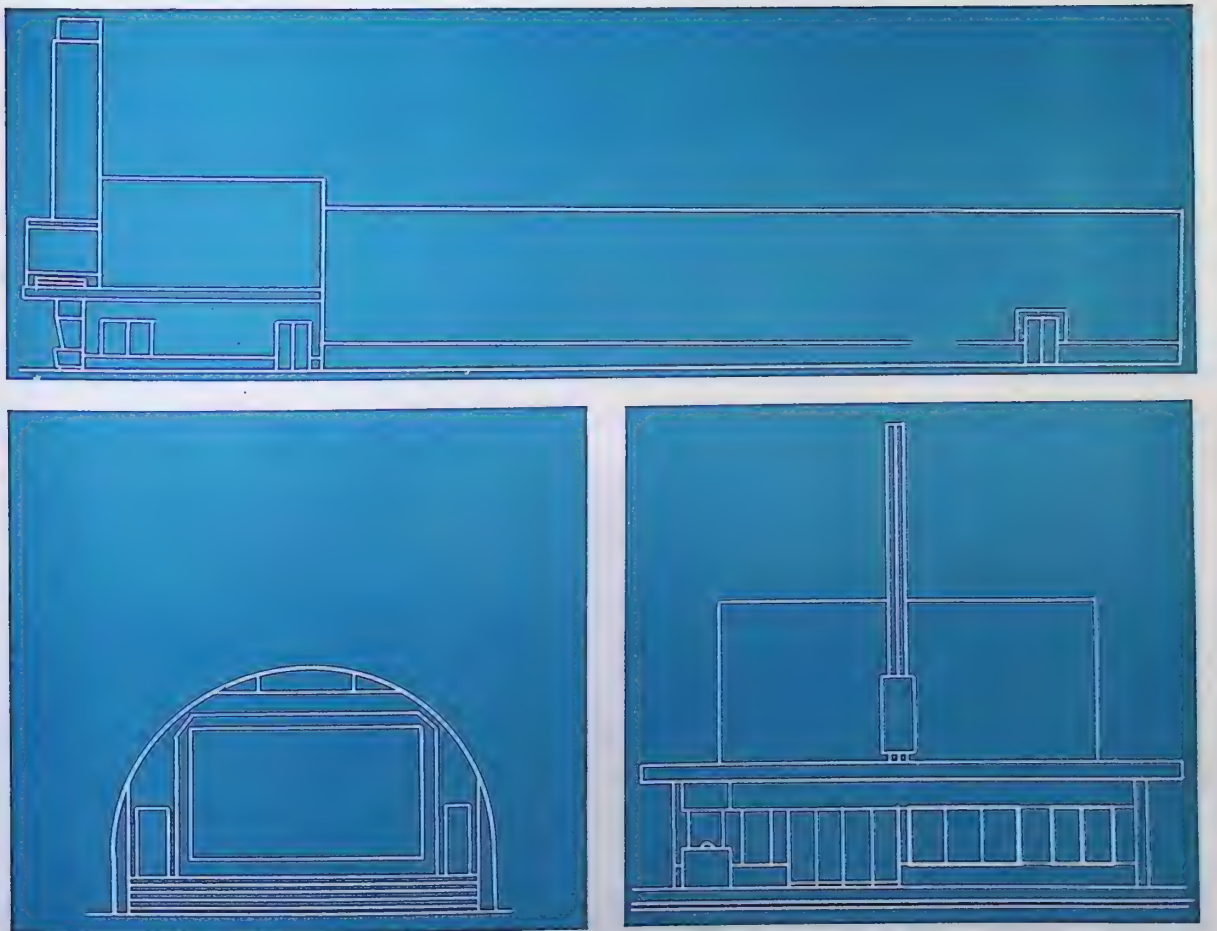
Interior and exterior lighting is controlled from manager's office, and auditorium lighting is also controlled from booth.

Exit and special designation signs, such as Manager, Telephone, Men, Women, and the like are on plate glass edge lighted from above.

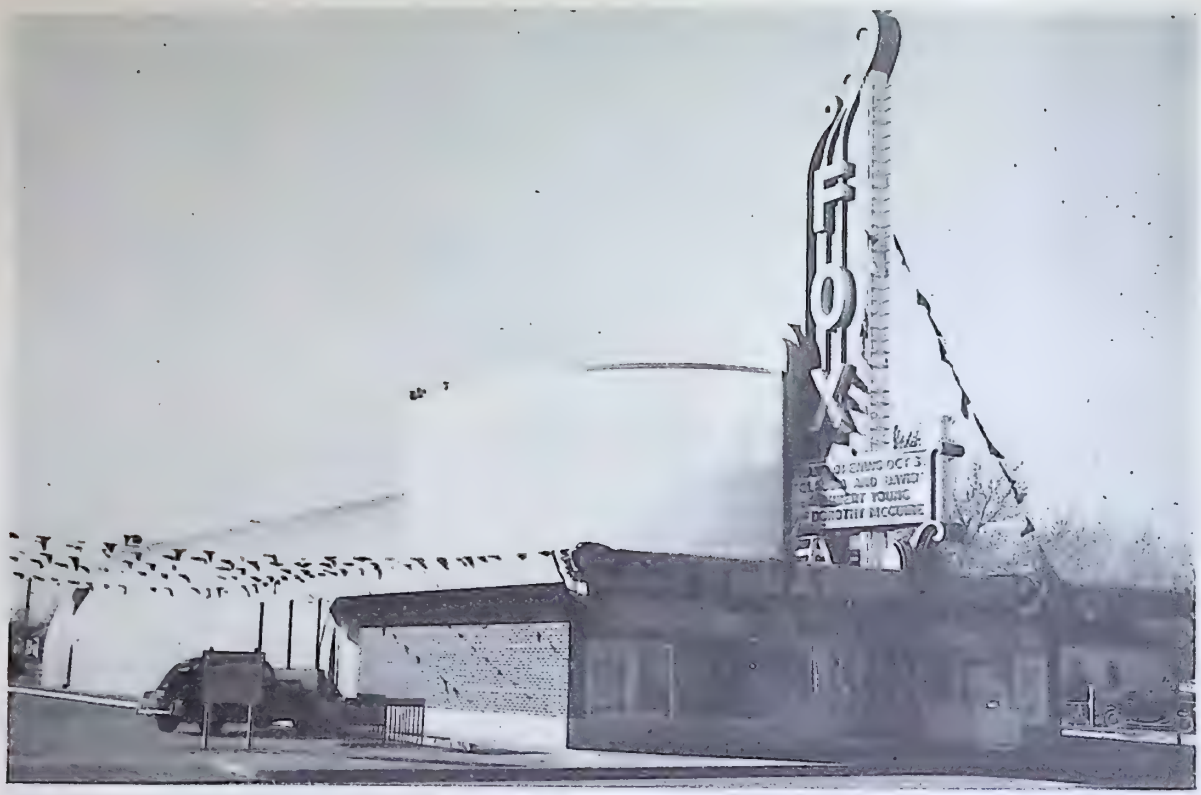
Insulation is provided in all Quonset sections by two layers of blanket insulation, one over purlins under corrugated sheets, the other on back edge of purlins.

Theatre is fire-proof throughout.

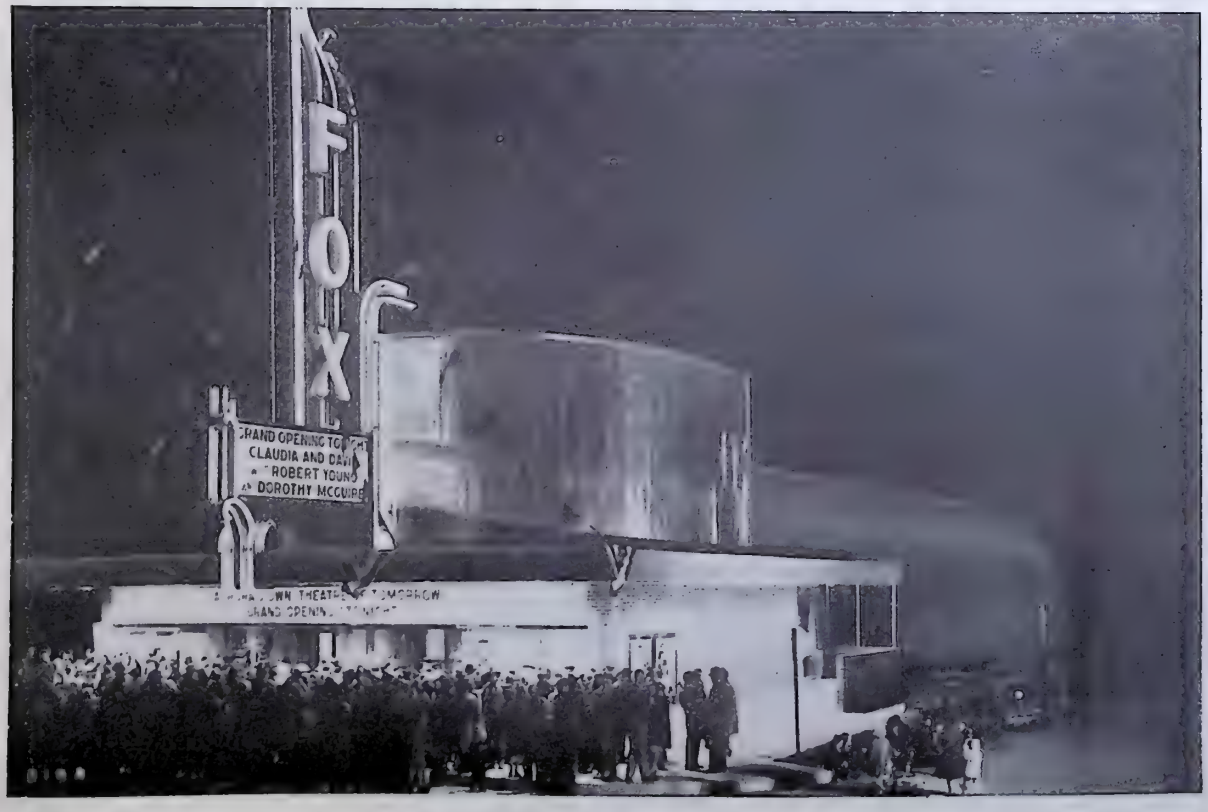
On east side of building is parking lot area lighted by floods, providing space for 80 cars.

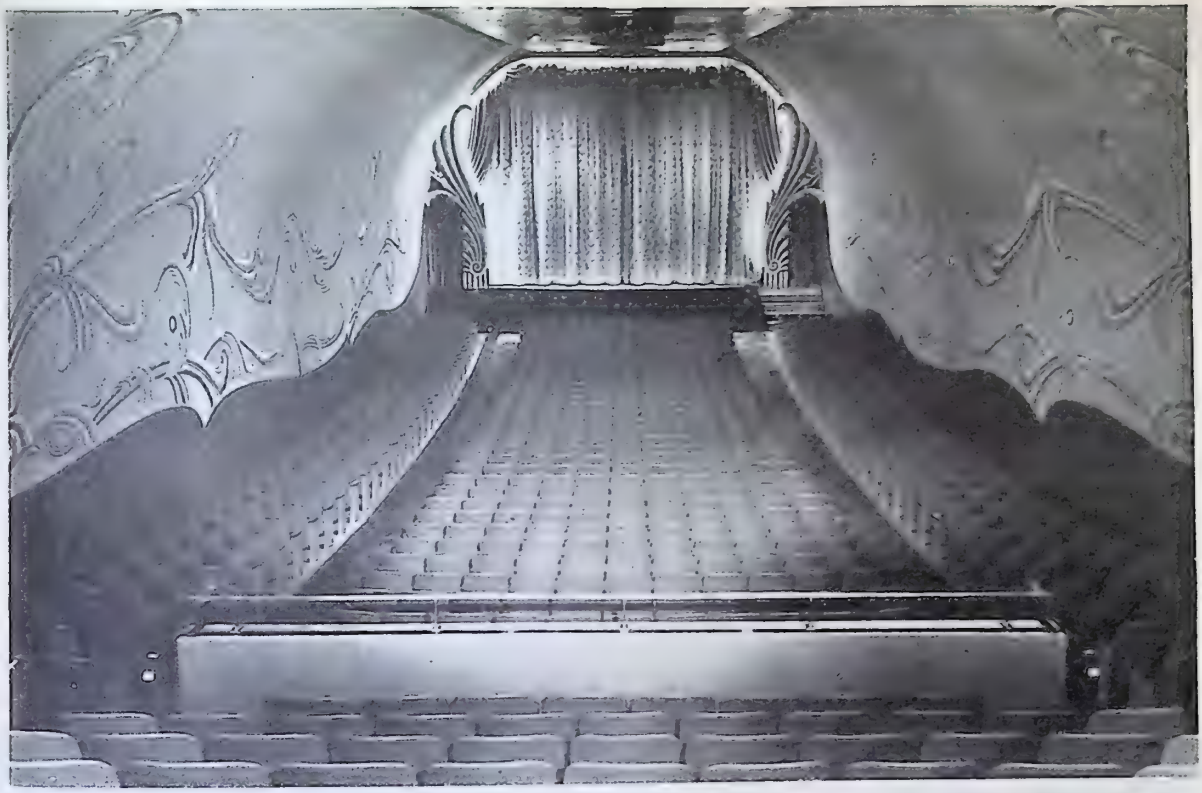


ELEVATION AND SECTION DRAWINGS show other details of the Fox Theatre, Aurora, Colorado. Top is the side elevation; left center, the rear elevation; right center, the front elevation; and bottom, the longitudinal section on the median line. The front portion up to the marquee is of masonry, continuous across the front and down the sides and above has a semi-circular frame consisting of Quonset ribs set horizontally, fastened to upright structural steel, faced with corrugated aluminum. In the rear is the Quonset-type structure resting on a concrete foundation wall three feet above grade. Walls may be any desired height.



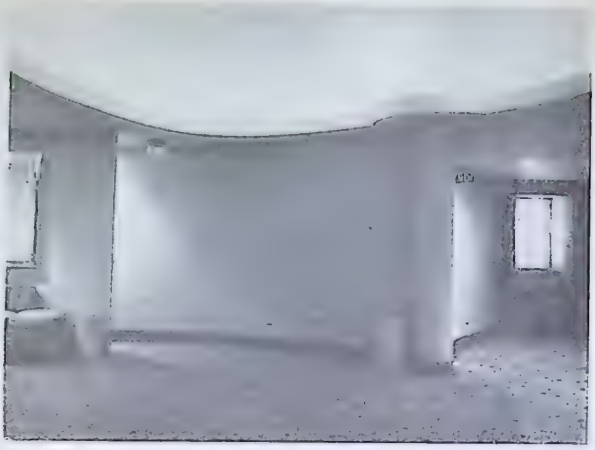
THE FOX THEATRE, Aurora, Colorado, is seen by both day and night and from both sides. The portion under the marquee is faced with a structural tile cream base with cream structural glass above the underside of the display frame under the marquee ceiling. The material on the sides is a kiln-run red brick above the tile base. The marquee is faced with the structural glass. The soffit is plaster on metal lath. The concrete vestibule floor and the sidewalk in front are colored a quarry red. Above the marquee are two display frames, back to back, above which, to 65 feet above the sidewalk, rises a vertical sheet metal sign. Sign is constructed of sheet metal.





THE STADIUM SECTION of the auditorium is built up of structural steel, with steps of steel plates and angles and colored concrete slab over rib lath. Steps are 36 inches wide and 12 inches high. The rear wall of the stadium curves, as it is the inner section of the upper, semicircular front portion. The projection booth has a front curving into the stadium area. Ceiling over the stadium area, beyond the Quonset section is flat, plastered on metal lath. Side walls have a Keene cement wainscot 5 feet high running around the face of the projection booth. Between wainscot and ceiling at this point, lath is sprayed with 3/4-inch Limpet asbestos.

THE LOUNGE, with windows to the street, is shown here from an angle that reveals the entrance to the powder room and ladies' lounge. Not shown is the shelf of black structural glass, with mirrors above and fluorescent light units in the shelf. Walls are papered with striped design, applied on the diagonal above the base.



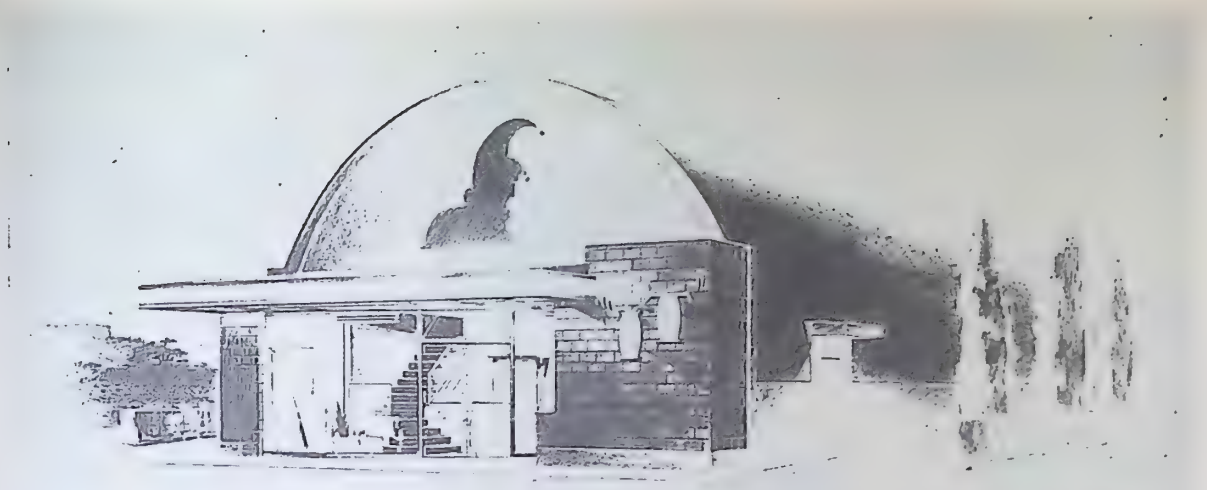
SWINGING THE CAMERA TO THE RIGHT, the entrance to the men's lounge comes into view. The lounge area in both locations is carpeted, with the toilet portion having a tile floor and a 6-foot tile wainscot. Both toilet rooms have light fixtures containing bacteria-destroying units. Left auditorium ramp is opposite the entrance.

THE UPRIGHT SIGN, constructed of sheet metal, rises to a height of 65 feet above the level of the sidewalk. The two large attraction boards, back to back, are installed a few inches above the top of the marquee.

THE LOWER PORTION OF THE FRONT is faced with structural tile base and structural glass above, both in a cream color. On the street face of the lounge, a large picture window provides light and a view of the interior. The sidewalk, as well as the concrete floor of the vestibule, is colored in a quarry red. The interior and exterior lighting is controlled from the manager's office, with auditorium lighting also controlled from the projection booth.

THE CONCESSION AREA is at the back of the lounge, between the entrance ramps to the auditorium, under the stadium, with curved, band-shell-type walls. There are cases for the display and sale of candy, popcorn, ice cream, and sandwiches. The area is back-lighted by a reverse cove containing neon tubing and by spots.

THE MANAGER'S OFFICE has plate-glass windows, with draw curtains, facing into the lounge and vestibule. The sides and front of the box office are plate glass, with aluminum exterior facing below the shelf and stainless steel facing of toe space. The floors of the manager's office and the box office are covered with asphalt tile.



THE IT THEATRE, Mathis, Texas, in basic structure is a standard Quonset 40, erected on top of concrete foundation walls which extend 5 feet above the high point of the auditorium floor. The end walls of the standard building were not used. In their stead, walls were framed of straight Stran-Steel sections to suit the requirements of the building. The rear wall was sheathed solid on the exterior with corrugated iron applied horizontally to the framing. The front end wall, above the marquee was lathed on both sides, stuccoed on the exterior and plastered on the interior. These exterior end walls were filled with loose Zonolite insulation.

THE IT THEATRE, MATHIS, TEXAS

Gidney Talley Enterprises, Owner — **Smith-Pitts-Macpherson, Architects**

DeHaven Pitts
Architect

The basic structure of the It Theatre in Mathis, Texas, is a standard Quonset 40 as manufactured by the Stran-Steel Division of the Great Lakes Steel Corporation. This standard building was erected on top of concrete foundation walls which extend 5 feet above the high point of the auditorium floor.

The end walls of the standard building were not used. In their stead, walls were framed of straight Stran-Steel sections to suit the requirements of this building. The rear end wall was sheathed solid on the exterior with corrugated steel applied horizontally to framing. The interior side of rear end wall was lathed with expanded metal lath and plastered with Portland cement plaster. The front end wall, above marquee was lathed on both sides, stuccoed on the exterior side and plastered with Portland cement plaster on the interior. These exterior end walls were filled with loose Zonolite insulation material.

The projection room wall—between projection room and auditorium—was framed of 6-inch Stran-Steel sections, lathed both sides, plastered on projection room side with Portland cement plaster, and plastered on balcony side above seats with Zonolite acoustical plaster in three coats, the scratch coat being composed of a mixture of gypsum plaster and acoustical plaster. The 6-inch space between plaster finishes was filled with loose Zonolite insulation material.

The roof framing was modified by the addition of extra purlins at the mid-point between standard purlin spacings. This was done to permit closer nailing of corrugated iron roofing and to stiffen the building longitudinally. All purlins were welded to curved ribs. Extra ribs were added at points of greatest stress such as at curtain track and proscenium arch.

In order to confine the roof insulation and to prevent any water, which might condense under corrugated iron or leak through laps in the corrugated steel, from entering insulation, a layer of asphalt saturated fiberboard ⅛-inch thick was installed between the ribs and directly under the purlins. The under side of ribs was furred with ¾-inch furring channels over which was applied expanded metal lath.

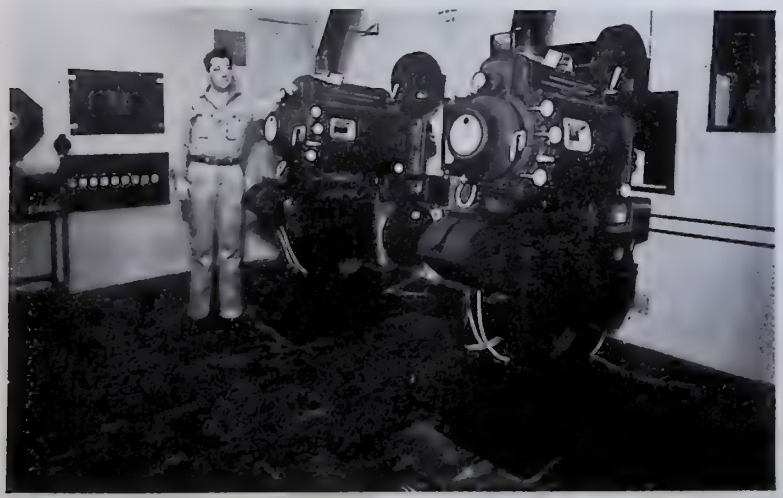
The entire inner surface of the Quonset was then given a scratch coat of Zonolite acoustical plaster mixed with gypsum plaster. The space between ribs above plaster was then filled with loose Zonolite insulation material. One more coat of Zonolite acoustical plaster was applied over scratch coat.

The splayed surfaces of proscenium arch and the suspended trough at high point of ceiling were constructed of fur-

THE GUIDING SPIRITS of the It Theatre are Gidney Talley (seated), president of Gidney Talley Enterprises, Inc., owner of the theatre, and Leon A. Couch, the house's manager. The walls of the manager's office, as well as those of the box office and foyer, are of concrete block. While the Gaiety Theatre, Inlet, New York, was probably the first Quonset-type theatre to open, the It Theatre, opening on August 15, 1946, was the first, real, all-year cinema.

THE FOYER is open to full view of the street by means of plate glass extending from floor to ceiling (note below) the entire width of the foyer. Entrance doors are of tempered plate glass, ¾-inch. The glass front is recessed to receive the box office outside of the foyer. The foyer ceiling is furred and plastered with concealed cove neon lighting forming a panel between entrance and standee doors. The standee area is treated to reduce noise level.

THE PROJECTION-ROOM FLOOR and balcony are framed of concrete independent of the Quonset framing. The projection-room floor is covered with asphalt tile, as is the toilet room opening on to the projection room. Film cabinets and rheostat controls are built into the wall between the projection room and the generator room. The only furnishings and equipment not built-in are the projection machines, the rewind table, and the amplifier rack.



ring channels and metal lath and suspended from roof framing after scratch coat was placed on under side of Quonset ribs. These surfaces were then plastered the same as Quonset ceiling. The under side of balcony projection and standee ceiling were also lathed and plastered the same as Quonset ceiling.

The interior face of concrete walls below Quonset springline in auditorium was plastered with portland cement plaster and painted with floor enamel.

The rear wall of stage was framed of 6-inch Stran-Steel studs, plastered on the stage side with Zonolite acoustical plaster, filled with rock wool batts, and plastered on back side with Portland cement plaster. This partition supports a platform above speakers on which are mounted the blower, duct heater, and cooling coils.

The motor, compressor, and evaporative condenser for the air-conditioning system is housed in a lean-to attached to the rear end wall.

Cooled or heated air is distributed through a central duct running the length of the building, at the high point of Quonset ceiling, through the projection room and down the front end wall to foyer, managers office, and box office. Air is spilled into the auditorium through three air diffusing outlets. Return air is drawn from under the stage into a metal duct into which are housed thirty-four 36-inch Sterilamps.

Air is exhausted from toilet rooms and from projection room and machines through a metal duct which circles the building and to which is attached an exhaust blower located in the generator room adjacent to projection room.

The projection-room floor and balcony are framed of concrete independent of the Quonset framing. The projection-room floor is covered with asphalt tile, as is the toilet room opening on to the projection room. Film cabinets and rheostat controls are built into wall between projection room and generator room. The only furnishings and equipment not built-in are the projection machines, rewind table, and amplifier rack.

The standee area has been treated to reduce noise as much as possible. The floor is heavily carpeted. The walls are constructed of a lightweight concrete block having a natural rose color and a high sound absorbing quality. The ceiling is plastered with acoustical plaster.

Toilet rooms opening off the standee are small but complete. Floors and base are of terrazzo. Walls are painted plaster at present but provisions have been made for installation of ceramic tile at a later date. Ceilings are painted plaster. Lights are flush with ceiling and protected by tempered glass lenses.

The foyer is open to full view of the street by means of plate glass extending from floor to ceiling the entire width of foyer. Entrance doors are of tempered plate glass ¾-inch thick. The glass front is recessed to receive the box office outside of the foyer. The walls of foyer are of the same concrete block used in the standee, as are the walls of manager's office and box office. Foyer ceiling is furred and plastered with concealed cove neon lighting forming a panel between entrance and standee doors.

THE AUDITORIUM of the It Theatre was first given a scratch coat of Zonolite acoustic plaster mixed with gypsum plaster. The space between the ribs above the plaster was then filled with loose Zonolite insulation material. One more coat of Zonolite acoustic plaster was applied over the scratch coat. The sprayed surfaces of the proscenium arch and the suspended trough at high point of ceiling were constructed of furring channels and metal lath and suspended from the roof framing after the scratch coat was placed on the under side of the Quonset ribs. The under side of balcony projection was also lathed and plastered in the same way.

The stairs from balcony descend into the foyer. These stairs have transparent Plexiglas railings ¾-inch thick set in a stained wood base which houses concealed fluorescent lights. The top edge of railings is sanded to permit light to escape, thus producing the effect of a glowing rail floating in air.

Into the wall between doors from foyer to standee is built the only fixed display frame, lighted from above. A movable display frame is used behind glass front to advertise current pictures.

The marquee is constructed of concrete monolithic with projection-room framing. It is faced with monel metal and flashed glass behind which is concealed neon lighting. No attempt has been made to use the marquee as an advertising medium.

Exterior decoration is simple. Cast aluminum letters attached to the exterior masonry wall and silhouetted by neon light concealed on the back side of each letter form the name "It" and serve as the only sign panel. The silhouette in the circular end wall of Quonset is fabricated of heavy sheet metal painted black and outlined by neon tubing concealed behind a turned-down edge.

All of this tends to force attention to the brightly lighted foyer below the marquee and thus to the box office and theatre entrance. The exterior design is an experiment in simplicity based on the belief that the people of a small town depend on the theatre operator to provide them with good shows and a comfortable building, and, so long as he lives up to their expectations in these matters, they will attend the shows he offers regularly.

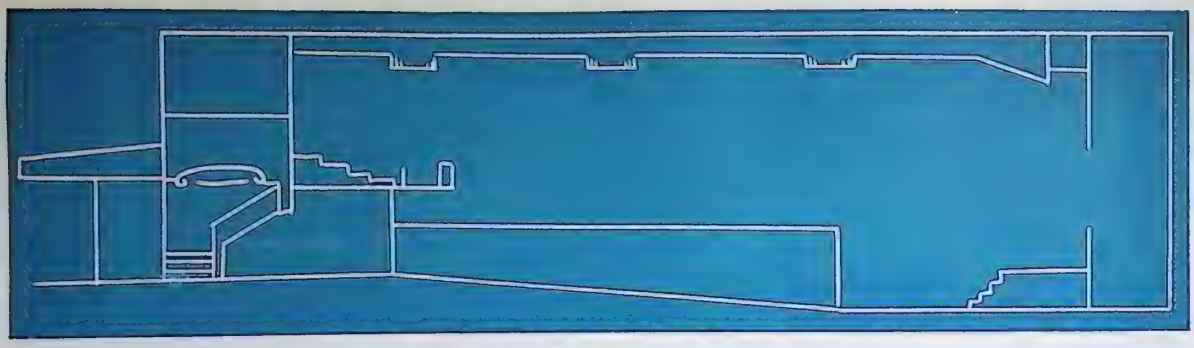
With these beliefs uppermost in their minds the owner and his architects have concentrated their efforts toward providing the maximum in comfort and safety for the theatre patrons. The building is fireproof and provided with ample exits. The seats are the best money can buy and are spaced 34 inches apart to provide comfortable seating and ample leg room. There is no need for discomfort while viewing the picture.

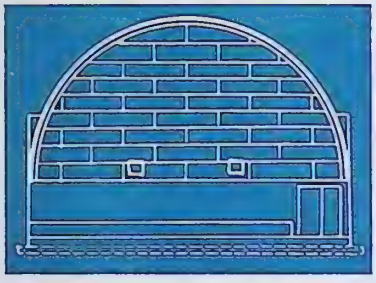
The building is thoroughly insulated so that the patrons are assured of comfort even on the hottest days. The roof insulation is equivalent to that of a cold storage vault and the heat gain or loss is practically nil.

The air-conditioning system is designed to maintain an even temperature the year round and Sterilamps have been installed to prevent the distribution of air-borne bacteria, thus making it safe for both children and grown-ups to attend the theatre at all times.

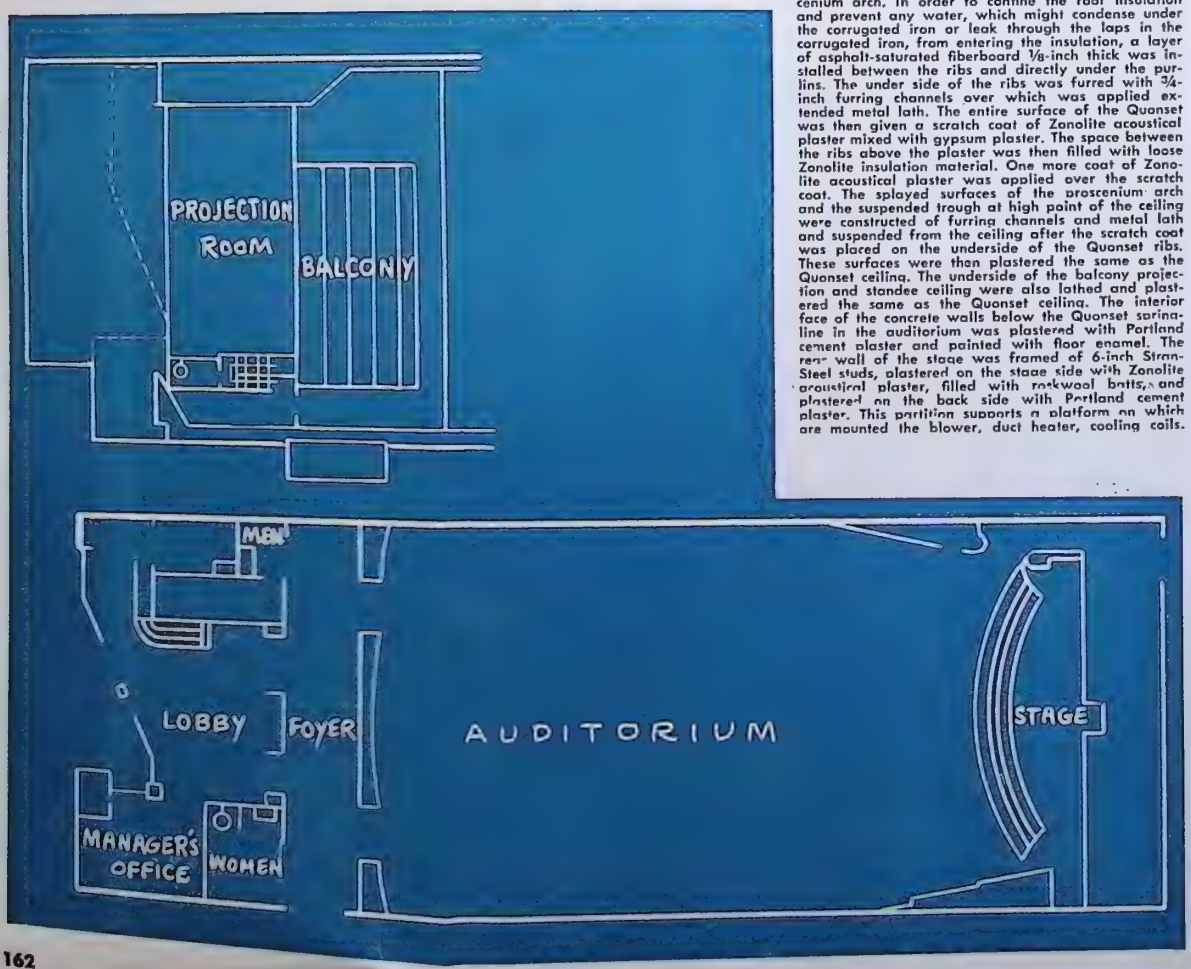
The form and interior treatment of the auditorium, plus the finest sound equipment, has produced acoustical properties unexcelled in the finest theatres. There is no strain in listening to the sound. Sight lines have been developed that permit easy view of the screen from all seats and this, plus the installation of the best in screen and projection equipment, eliminates all strain in viewing the picture. In this connection, it might be noted that the screen border is grey instead of black, thus further eliminating eyestrain.

Another advantage gained from the shape of the auditorium is the diffusion of light reflected from the screen, thus providing sufficient light in the auditorium for seeing without the use of side or aisle lights. There is no sensation of being in a black void looking at a brilliantly illuminated screen with the resultant eye strain which accompanies such a condition.





THE DRAWINGS reveal the grass construction details. Above is the longitudinal section on the median line. Middle left shows the front elevation, with the rear elevation at middle right. Below are the floor plans of the auditorium and the balcony levels. Basic structure is the Quonset 40, with specially constructed end sections to serve the purposes of a theatre. The projection-room wall, between the projection room and the auditorium, was framed of 6-inch Stran-Steel sections, lathed on both sides, plastered on the projection-room side with Portland cement plaster and plastered on the balcony side above the seats with Zonolite acoustical plaster in three coats, the scratch coat being composed of a mixture of gypsum plaster and acoustical plaster. The 6-inch space between the plaster finishes was filled with loose Zonolite insulation material. The roof framing was modified by the addition of extra purlins at the mid-point between standard purlin spacing. This was done to permit closer nailing of corrugated iron roofing and to stiffen the building longitudinally. All purlins were welded to curved ribs. Extra ribs were also added at points of greatest stress, such as at curtain track and proscenium arch. In order to confine the roof insulation and prevent any water, which might condense under the corrugated iron or leak through the laps in the corrugated iron, from entering the insulation, a layer of asphalt-saturated fiberboard ⅛-inch thick was installed between the ribs and directly under the purlins. The under side of the ribs was furred with ¾-inch furring channels over which was applied extended metal lath. The entire surface of the Quonset was then given a scratch coat of Zonolite acoustical plaster mixed with gypsum plaster. The space between the ribs above the plaster was then filled with loose Zonolite insulation material. One more coat of Zonolite acoustical plaster was applied over the scratch coat. The splayed surfaces of the proscenium arch and the suspended trough at high point of the ceiling were constructed of furring channels and metal lath and suspended from the ceiling after the scratch coat was placed on the underside of the Quonset ribs. These surfaces were then plastered the same as the Quonset ceiling. The underside of the balcony projection and standee ceiling were also lathed and plastered the same as the Quonset ceiling. The interior face of the concrete walls below the Quonset springline in the auditorium was plastered with Portland cement plaster and painted with floor enamel. The rear wall of the stage was framed of 6-inch Stran-Steel studs, plastered on the stage side with Zonolite acoustical plaster, filled with rockwool batts, and plastered on the back side with Portland cement plaster. This partition supports a platform on which are mounted the blower, duct heater, cooling coils.



THE GAIETY THEATRE, INLET, NEW YORK

Morris Shulman, Owner

There seems to be two main outlets for theatres whose auditoriums utilize the Quonset 40. First, as has been seen, in the smaller communities, either more or less new developments in the environs of large cities or in small towns where the potential patronage, however eager to enjoy the relaxation and entertainment afforded by motion pictures, does not permit of the expenditure of sums of money running into six figures.

The second main outlet appears to be in the smaller resort communities where the patronage is definitely seasonal, without sufficient year-'round population to permit off-season operation. Such a location is Inlet, New York, snuggled in the Fulton Chain of Lakes section of the Central Adirondacks, a site so insignificant to geographers that it is not even a dot on the map, yet withal a spot dear to many a vacationer's heart.

In such a location, it is a foregone conclusion that, while vacationists find plenty with which to occupy their time during the daylight hours, the nights are probably considerably longer than necessary completely to satisfy even an insomniac. Hence, some outlet for evening activity is desirable.

Up to now, however, much as it would have been nice to have a real motion-picture theatre, the potential trade in and around Inlet was not of sufficient magnitude to make it economically feasible to build a theatre of the size desired for the summer trade, or, for that matter, for the year-'round trade, either. However, motion pictures were shown in Inlet, at an open-air, 400-seat theatre rather famed in the area, especially for the canvas cover that was held in reserve for rainy weather.

But the war brought an answer: the utilization of a Quonset for the auditorium shell.

And so it was that Morris Shulman, who also, out of Utica, operates the Club Theatre, Clark Mills, New York, gave Inlet its theatre. While it is obvious that some of the theatres herein pictured, notably the It Theatre, Mathis, Texas, and the Fox Theatre, Aurora, Colorado, were under construction at the same time as the Gaiety Theatre, it is the last cinema, so far as can be determined at this time, that was the first Quonset motion-picture theatre to throw open its doors to the public, probably about a week or so before the August 15 on which the It Theatre opened.

It is too bad that complete data are not available for the Gaiety, but apparently the Quonset part of the theatre was erected more or less according to the schedule earlier pictured in these pages, and the necessary other construction erected as was obviously required, all with a minimum reliance of paper work. To William Netherton, a year-'round resident of Inlet, Owner Shulman gave credit for his direction of all construction plans within the theatre.

The shell of the auditorium is a Quonset 40, in the 100-foot length, with, by the very nature of the arch rib construction a maximum height of 20 feet. Only five days were required to erect the fire-proof Quonset, but the interior required an additional three weeks. Thermal insulation has been placed next to the corrugated metal covering of the Quonset, and the whole covered on the inside with Celotex, striped to give the effect of paneling about as wide as the 4-foot distances between the arch ribs of the Quonset. And, of course, Celotex can be further decorated, if the manufacturer's suggestions and methods are followed.

The rear end of the theatre has, apparently, been finished off in about the same way as are Quonsets erected for other, non-entertainment purposes. However, the inside has been finished in the same way as the rest of the auditorium, the screen had been mounted on a pedestal to raise it to a height permitting good vision from all seats and located at a sufficient distance in from the rear wall to permit the speaker system to be placed in the rear. The screen housing is also braced from the ceiling.

The projection room is located above the rest rooms, and all built within the Quonset span, backing up to the front wall of the auditorium.

The auditorium of the Gaiety Theatre is presently equipped with some 300 movable chairs of a type that may remind old-timers of the days when movies were shown when the local undertaker did not need the seating facilities! However, there is space, according to Owner Shulman, to install 600 of the traditional theatre-type permanent chairs.

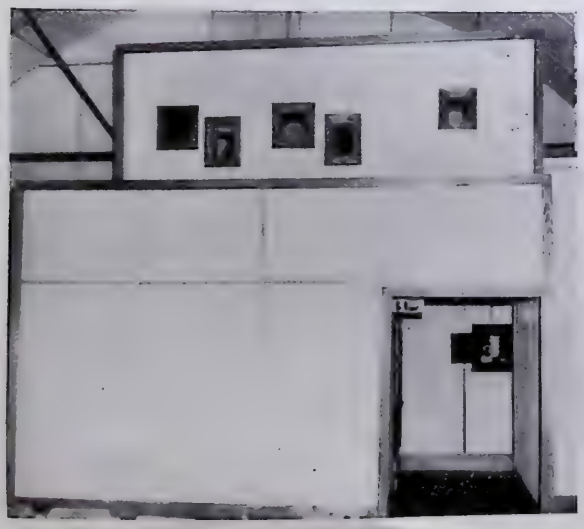
A frame structure, fronting the thoroughfare, connects with the main Quonset portion of the theatre.

As the theatre opened, the schedule provided for two shows a day, the first starting at 7:15 p.m. and the second going on two hours later. Indicative of the desire, even need, of entertainment at Inlet in spite of the usual out-of-doors pleasures is the fact that, on all rainy days, a special matinee is run—all of which should be eloquent answer to the ever-forthcoming query concerning the audibility of the pitter-patter of rain on the corrugated surfacing of the Quonset proper.

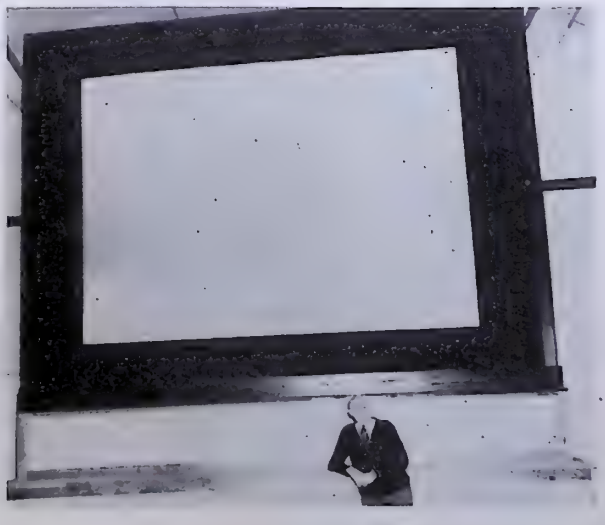
THE GAIETY THEATRE, Inlet, New York, opened about a week before the It Theatre, Mathis, Texas. Here is an example of the Quonset-type of construction adapted to the needs of operation in summer resorts.

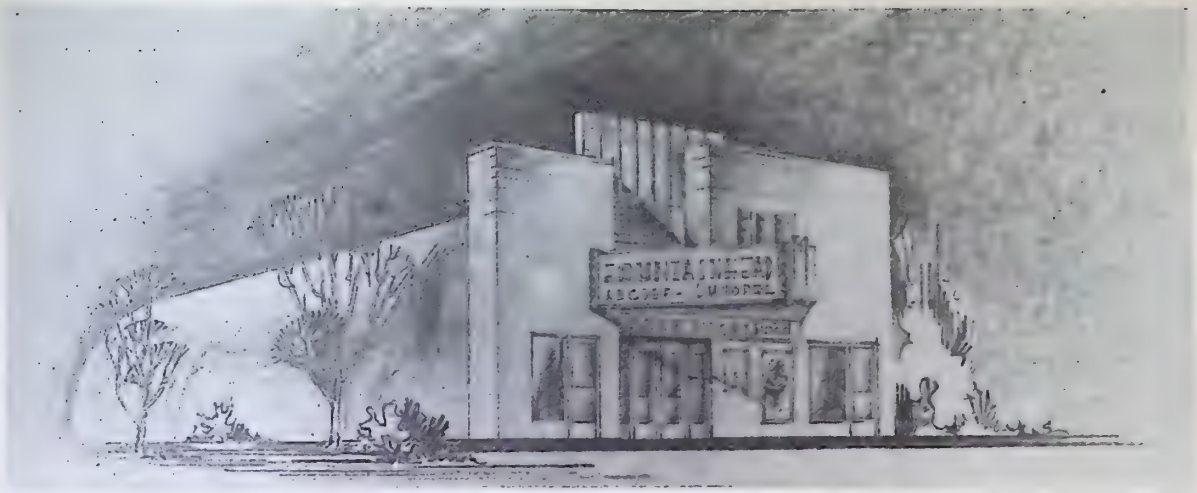
THE AUDITORIUM of the Gaiety Theatre is a Quonset 40 in a 100-foot length, with, by the very nature of the arch-rib construction, a maximum height of 20 feet. While only five days were required to erect the Quonset, an additional three weeks were required to complete the interior. Thermal insulation was placed next to the corrugated metal covering of the Quonset, and the whole covered on the inside with Celotex, striped to give the effect of paneling about as wide as the 4-foot distances between the arch ribs of the Quonset. Subsequently, the Celotex can be further decorated (follow maker's instructions!) if it is desired.

THE PROJECTION BOOTH and the rest rooms are in the specially constructed portion beneath the proximal end of the Quonset span. Lobby space for the theatre is constructed outside the Quonset length. The booth, apparently not as spacious as are those designed to take full advantage of available space, is modernly equipped.



THE SCREEN is mounted on a special framework, erected under the distal end of the Quonset span. The theatre, constructed under the direction of William Netherton (seen here), a year-'round resident, is designed to meet a specific, if not strictly seasonal, demand. Seasonal resorts should find Quonset theatres good business.





THE QUONSET-TYPE THEATRE for Mediapolis, Iowa, designed for I. R. Glesne by Wetherell and Harrison, is another of the possibilities of using the Quonset 40, with a specially designed theatrical front. While the utilization of Quonsets as auditorium boxes obviously simplifies construction problems, as well as effecting a substantial saving in the always-high first costs, the necessity of an architect of ability is no less essential, for it is only a good architect who can develop the proper ideas for the non-Quonset portions of the structure and the design of the whole, that will give the owner-to-be a theatre of which he can be very proud.

A QUONSET THEATRE, MEDIAPOLIS IOWA

I. R. Glesne, Owner — **Wetherell and Harrison, Architects**

In the southeast corner of the state of Iowa, bordering on the Mississippi River—decidedly remote from the city of the same name—lies Des Moines County, with Burlington as its chief city. But some 20 miles to the north of this city is the little town of Mediapolis, where, so far as is known, Iowa's first Quonset theatre is to be built, for I. R. Glesne, with Wetherel and Harrison as the architects.

Even in the sketch-and-plan stage, the new theatre becomes a contribution to an appreciation of what can be done, utilizing a Quonset 40 as the auditorium shell, and a front section of more orthodox treatment.

It has often been pointed out that no would-be theatre operator should ever attempt a building project without the assistance of architects of recognized standing in their profession and, if possible, tried and proved in the tricky art of theatre design. While the utilization of Quonsets as shells of the auditorium obviously simplifies construction problems, as well as effecting a substantial saving in the always-high first costs, the necessity of an architect of ability is no less essential, for it is only a good architect who can develop proper ideas for the non-Quonset portions of the structure, and the design of the whole, that will give the owner-to-be a theatre to which both he and his community can point with justifiable pride.

With the utilization of a Quonset 40 as the framework for the auditorium of a theatre, there is not much that can be done to vary the external aspect of this part of the structure. It then is up to the ingenuity of the architect so to develop the street-side portion of the theatre to the best advantage.

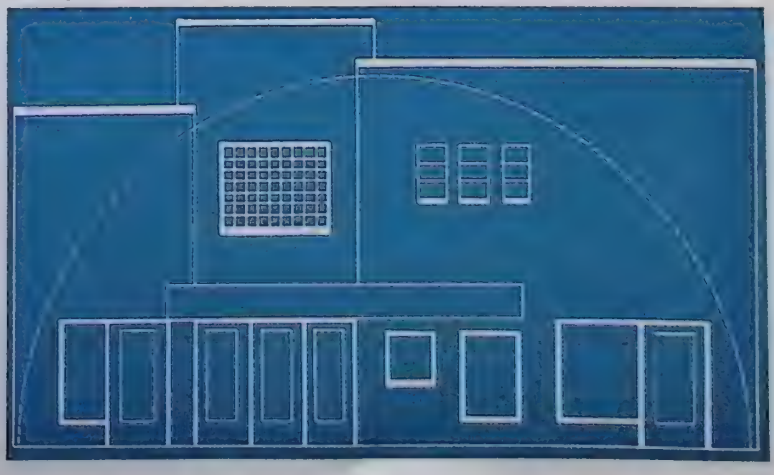
As with other theatres, what can be done to a lot depends on the size of the lot. If, for example, depth of lot is at a premium, then many of the theatre rooms, if not all of them, will have to be constructed within the span of the Quonset arch ribs. If, on the other hand, an indefinite amount of space more than 100 feet be available, then the maximum seating can be arranged beneath the Quonset portion, and the architect given a free rein to design the fore-structure in the same manner as he would the orthodox theatre.

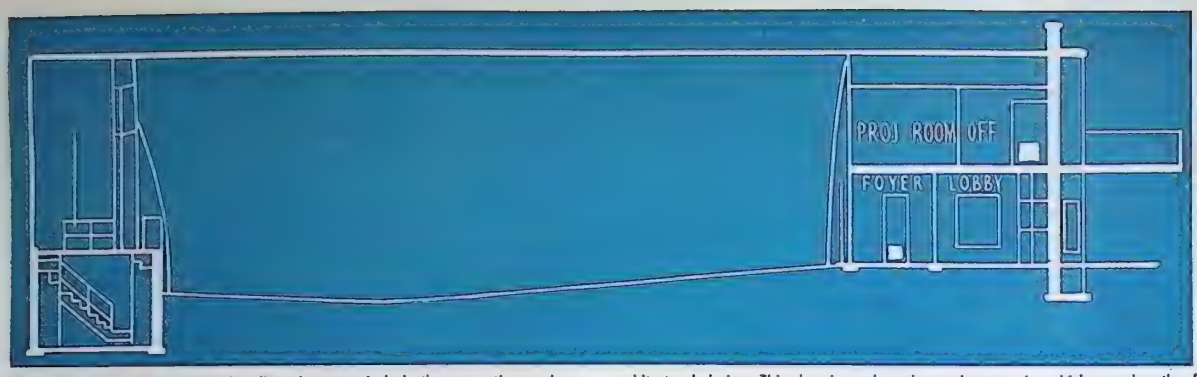
In this theatre, for example, designed by Wetherell and Harrison, the theatre is virtually all Quonset, save for the facade which, at first glance reveals naught of the Quonset from which the theatre is really built. The Quonset, with its arch on a 20-foot radius, allows ample room to build the projection room, manager's office, and two storage rooms on the second-floor level, and, on the first floor a popcorn and candy shop, about 13 by 8 feet, on the left of the theatre entrance, and serving both the transient passers-by and the theatre patron already passed the doorman, and also, to the right of the box office, a second store, about 13 feet square, without a direct theatre tie-in.

It is the general feeling among theatre men not intimately connected with any particular fad or fancy in the construction field that the utilization of Quonsets is a definite answer to the questions raised by the proponents of pre-fabrication, whether of steel or of other materials.

Here, such observers point out, one constructs the auditorium portion of the theatre from materials turned out on a production-line basis, from material of a pre-fabricated size and shape, and of interchangeable parts. But, they con-

THE FRONT ELEVATION shows how the facade is designed completely to mask the Quonset 40 from which the auditorium has been constructed. The dotted line shows the limit of the Quonset arch ribs. The Quonset has, of course, a radius of 20 feet, which gives sufficient height to erect at least part of a second floor at the front of the theatre to give ample space for a projection room of normal proportions for the ease and comfort of projectionists.



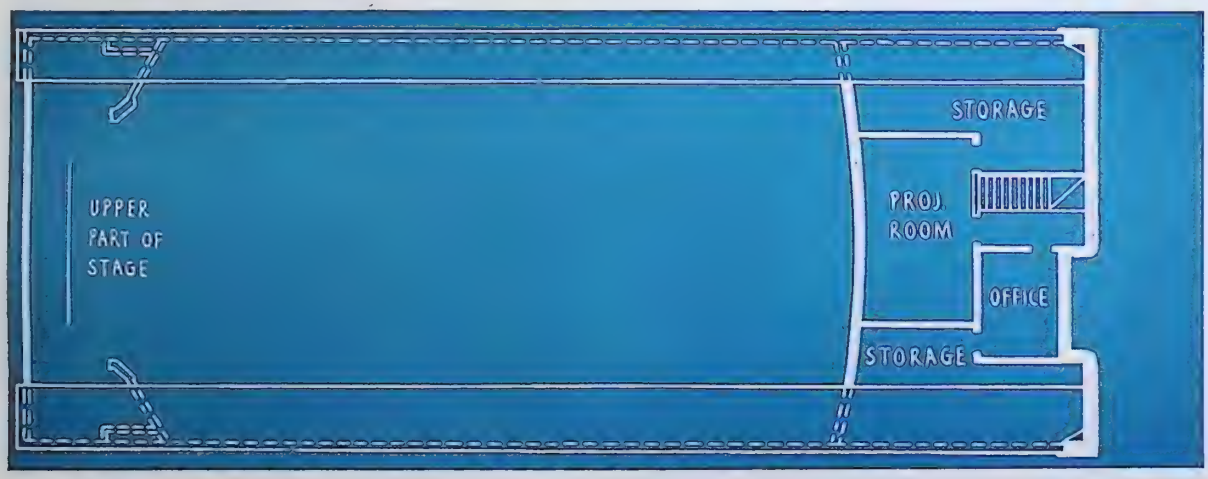


THE SECTIONAL VIEW on the median line, shows particularly the excavation made under the screen end of the theatre for the installation of heating equipment. It may be noted also how it has been designed that the marquee ceiling and the floor of the second-floor level are lined up, and, no doubt, tied together in the architectural design. This drawing, also, shows the ease in which any length of auditorium could be used, depending on the number of 20-foot Quonset sections utilized, with still the major construction expense constant, since only the very front and the very back are the only portions to be independently erected.

tinue, this pre-fabricated portion of the theatre is but its skeleton, with the coverings that are put on the framework quite up to the prospective owner and his architect and decorator.

With the idea of utilizing a Quonset 40 for the auditorium, the prospective owner probably achieves a saving through the economies of mass-producing the skeletal elements—in contrast to completed theatres—the while leaving up to his own architect the development of the front of the structure and to his decorator the inside treatments.

For smaller communities—and especially where civic pride would knowingly discourage the erection of a theatre the twin of one, possibly, in a rival community—the Quonset-type of construction seems to be the answer to the whole problem of low-cost theatres.



THE FLOOR PLANS show how the Quonset, with its arch on a 20-foot radius, allows ample room to build the projection room, manager's office, and two storage rooms on the second-floor level (above), and, on the first (below), a popcorn and candy shop (about 13 by 8 feet) on the left of the theatre entrance, and serving both the transient passers-by and theatre patron who has already passed the doorman, and, also, to the right of the box office, a second store (about 13 feet square) without a direct theatre tie-in. The men's and ladies' toilets are strategically located at either side of the standee area, which itself is quite ample for the house.

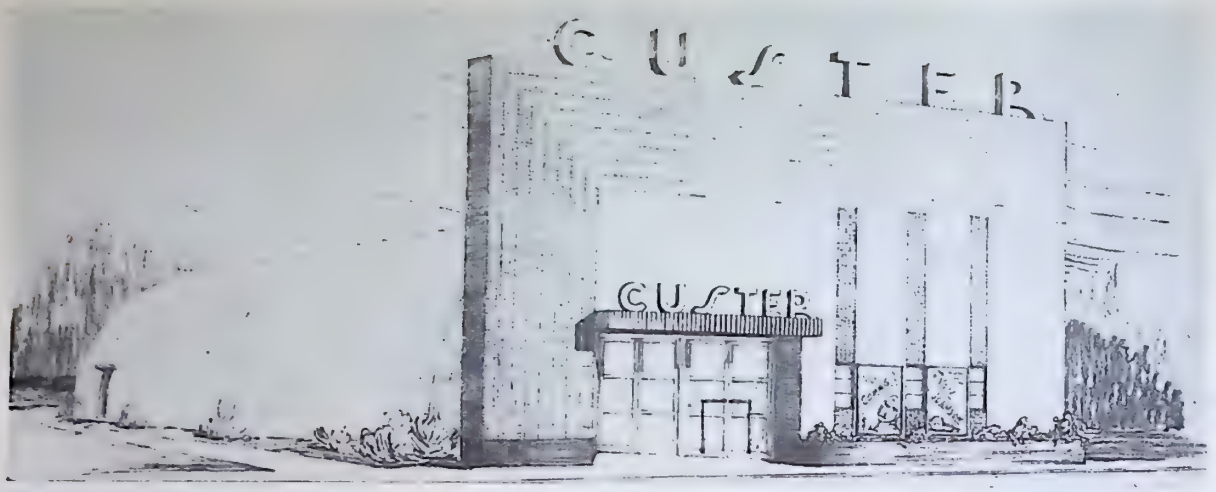
THE THROES OF CONSTRUCTION and equipping are shown here, and reveal that these problems, particularly those on equipment, are not unlike the problems encountered in theatres of orthodox construction.

A QUONSET THEATRE, BIG SPRING, TEXAS

Robb and Rowley United, Inc., Owner

Of the communities where Quonset movie theatres are being constructed, as represented by this presentation, the largest is Big Spring, Texas, whose 13,000 population hardly makes the shiretown of Howard County wholly urban. The presently unnamed theatre, now under construction by Robb and Rowley United, Inc., is of the type that reduces "original" construction to a minimum, by building a front and setting other parts of the theatre under the Quonset span.

THE QUONSET-TYPE THEATRE for Big Spring, Texas, being built for Robb and Rowley United, Inc., is another of the kind where little more than a masking front is constructed for the Quonset. At the top left is seen the inside view of the lobby and the relatively little new construction that has been needed. The upper right picture shows some of the bracing and truss work required for the proscenium opening, a view that can be duplicated in almost any theatre of the more orthodox type of construction. Below shows how the Quonset is erected atop a concrete foundation wall. This wall, of course, can be made to any desired height.



THE CUSTER THEATRE, CUSTER, SOUTH DAKOTA

H. H. Gates, Owner — **Charles D. Strong, Architect**

THE CUSTER THEATRE, Custer, South Dakota, is designed by Charles D. Strong (who also did the Fox Theatre, Aurora, Colorado) for H. H. Gates, and is yet another example of front construction for a Quonset.

THE PLANS show two principal details for the Custer Theatre, Custer, South Dakota. In the first place, there is the construction of the boiler room at the end of the Quonset, with a wall of proper size and composition separating it from the stage proper. The other distinguishing feature is the incorporation of the box office as an integral part of the manager's office. It is worthy of note, too, that the position of the stage-exit doors permit the easy handling of stage equipment, and the doors also may serve as emergency exits from the auditorium proper. The position of the candy and popcorn counter is in accordance with best extra profits design.

Vermiculite, A New Construction Material

Pre-Cast Slabs Bolted to Steel Framework Are an Answer to Pre-Fabricated Theatres

The pioneering spirit necessary to depart from the conventional methods of theatre construction was well exemplified during 1946 when Walter L. Morris of Knoxville, Tennessee, commissioned Fred Manley, of Fred Manley Associates, Knoxville architects and engineers, to draw plans for a new theatre to be located on Kingston Pike, one of the arterial highways into the city.

Because of war-induced shortages and other construction factors beyond control Manley devised a structure, essentially a version of pre-fabrication that would utilize, for the most part, non-critical materials—and use them in a way not previously considered.

By employing a welded structural steel frame for the main auditorium and stage, and enclosing it with an economical covering of pre-cast vermiculite concrete slabs, a construction method was evolved to effect not only constructional economies, but savings in time as well.

Thus it was that the Pike Theatre became the first of its kind in the country, erected by a method said to be more architecturally and constructionally feasible than the announced plans for all-steel pre-fabricated theatres.

The Manley organization planned and built its first theatre back in 1913, a house still in operation, and during the years since has had its full share of theatre design and construction in Tennessee and Kentucky. Morris also well knows the theatre, having served the industry in management capacities for more than 20 years.

THE MATERIAL VERMICULITE

While vermiculite is a generic term for any of a number of micaceous minerals, hydrous silicates derived generally from alteration of mica, commercial products are marketed under a variety of trade names, such as Zonolite, product of the Universal Zonolite Insulation Company, which has provided the technical summation presented below.

Technical Summary

Zonolite (or vermiculite) is an inert, featherweight, resilient material manufactured by exploding an unusual mineral which is an alteration product of mica. It is flaky in structure and is made up of approximately 1,000,000 separate laminations to the inch. Between each lamination is held a tiny amount of water. When small flakes of this ore are suddenly exposed to high temperatures, the water held between the laminations changes to steam, expands suddenly, and explodes the flakes into cellular granules of Zonolite insulation about 15 times their original size.

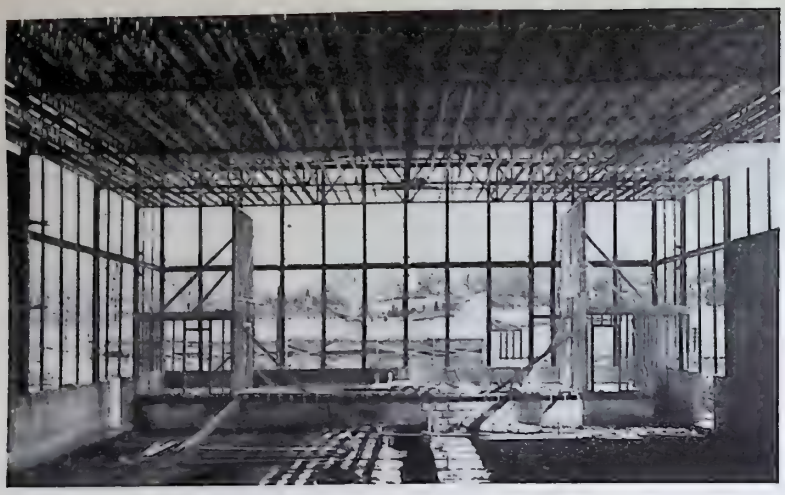
In the exploding process, countless numbers of dead air cells are entrapped between the laminations of the granules and it is from this air cell entrapment that Zonolite obtains most of its insulation value. During the exposure to the intense heat of the manufacturing process, the color of the ore changes from dark brown to gold or silver. Due to the fact that the individual laminations of the exploded granules are smooth and bright, it enables them to reflect radiant heat in the same way that a mirror reflects light. By obtaining this dual insulation value in Zonolite, it is able to insulate efficiently at all temperatures from sub-zero to 2,000 degrees Fahrenheit. Zonolite melts at about 2,500 degrees Fahrenheit.

Zonolite is fire-proof, rot-proof, termite-proof, vermin-proof, odorless, a non-conductor of electricity, chemically inert, and practically non-gyroscopic.

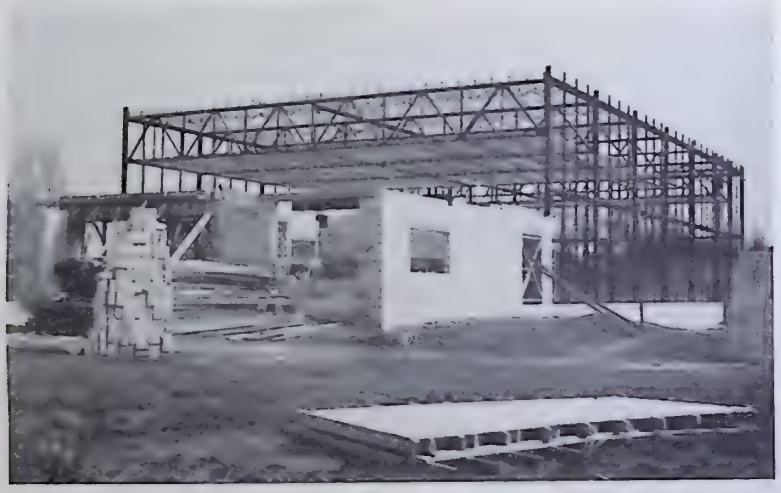
Zonolite weighs as little as 5 pounds to the cubic foot. It is a clean material, and is easy and pleasant to handle.

Being an inorganic material, Zonolite does not react with any other substance with which it is placed in contact in its normal use for heat and sound insulation. Zonolite has passed the Underwriters' Laboratories corrosion tests for thermal insulation materials. It has strong resistance to acids and other

THE PIKE THEATRE, Knoxville, Tennessee, is the first cinema to be erected by a method said to be more architecturally and constructionally feasible than the announced plans for the all-steel pre-fabricated theatre. The type of construction here represented involves a welded structural steel frame for the main auditorium and stage, with the spaces filled with pre-cast vermiculite slabs. None of the pioneering steps taken in the construction of the Pike Theatre of structural steel and pre-cast vermiculite slabs has been disappointing, and the final cost indicates an appreciable saving over what that of construction in masonry would have been.



THE CONSTRUCTION of the Pike Theatre is shown in these six pictures. From the first (above) can be obtained an idea of how the steel framework is placed. This was taken, however, not at the start, but some time after the work was well under way. Seen can be the stage in the making, together with its side rooms, as well as the studding to which the ceiling will be attached. At the picture's left can be seen part of two tiers of slabs.



A GENERAL VIEW of an early stage (above) of construction, before any vermiculite slabs have been set in place. The steel frame has been erected on the foundation wall of concrete. Below is seen the theatre, with its front portion of concrete block partly finished. The steel columns and verticals are all set to have bolted to them the 2½x4-foot and the 2½x6-foot vermiculite wall slabs. At the right of the picture, part of the first tier can be seen.

highly reactive substances. It does not dissolve, disintegrate, rot, nor give off odors when wetted.

In its loose granular form Zonolite is used extensively as a fill insulation for the walls and roofs of buildings. It also has many applications in industry for the insulation of furnaces, ovens, and many types of appliances in both the high- and low-temperature fields.

In combination with bonding materials, it is fabricated into a wide variety of products, such as pipe covering, insulating bricks, refractory insulating concrete, high-temperature insulating cements, insulating and acoustical plasters, acoustical tiles, insulating concrete roof fill, and insulating structural roof slabs.

Utilization Summary

Vermiculite insulating concrete is an extremely lightweight building material, made like ordinary concrete except that specially graded granules of vermiculite are used as aggregate instead of sand, gravel, or stone.

Insulating concrete is light gray in color and has the general appearance of ordinary concrete. Its texture can be made fairly porous or smooth, depending on the proportions of the mix and the type of finish. Zonolite aggregate particles usually do not exceed ⅛ inch in size.

Wetting does not deteriorate Zonolite concrete, but lessens its insulating value and, for this reason, it should be protected in some way so that water does not enter its cellular structure. Zonolite concrete may be water-proofed in two ways: (1) by covering its exposed surface with water-proof coatings of paint or built up roofing; and (2) by making it integrally water-repellent by the use of Zonolite water-proofing admix.

Zonolite concrete is most commonly used for the following purposes: (1) insulating roof fill for roof insulation, in this use, it can also be made to form cants and saddles and produce the proper slopes for roof drainage, (2) lightweight sound-proofing and insulating floor fill, (3) insulating structural roof decks, and (4) pre-cast block or tile for fire-proofing, sound-proofing, acoustical correction, and thermal insulation.

Zonolite, water-repellent concrete, used with re-inforcing trusses, makes an ideal roof or floor slab where a combination of structural properties, high thermal insulation, sound-deadening, sound-absorption, and light weight are desired at a reasonable cost.

The load-carrying capacity of this type of slab does not depend on the strength of the concrete used. The concrete should be of such a strength that it will not show indentations from service. A mix of 1:4 without any topping is recommended for roof slabs. Mixes of 1:4 or 1:5 usually meet floor-slab service requirements with suitable toppings.

The design of vermiculite pre-cast slabs, using Zonolite concrete and welded reinforcing trusses, is based on the webs of the trusses resisting all shearing stresses, the chords all bending stresses, and follows the regular design data and formulae for standard steel-truss re-inforcing.

For short spans, flat slabs are usually most economical, but for long spans channel slabs are less expensive. The forms for channel slabs are rather expensive, and the number of widths and depths should be kept low for this reason. The depth for flat slabs should be a minimum of 3¼ inches, as it is not practical to make trusses less than 2¼ total depth, and the steel should be covered with ½ inch of concrete.

Pre-cast blocks made of Zonolite water-repellent concrete offer many possibilities as a construction material due to their lightness of weight, excellent insulating, sound-absorbing, and sound-deadening properties.

Bearing in mind that the richer the mix (that is, the higher the amount of cement), the higher the strength, the greater the density and cost, and the poorer the insulation, the proportions should be such as to give the required strength and insulating properties.

Zonolite plaster aggregate is a feather-weight material, the lightest of all mineral aggregates, weighing about 216 pounds to the cubic yard in comparison with 2,700 pounds for sand. It is mixed, applied, and finished in the same manner as ordinary plaster.

Zonolite granular fill insulation is an easy type of insulation to install, as no special equipment is required. The material is poured from the bag and leveled off without tamping or fluffing, automatically filling every space with a uniform, tamper-proof, insulation.

Zonolite all-purpose plaster is formed by mixing a special grade of Zonolite plaster aggregate with ordinary fibered gypsum plaster and water. It can be used in any application where ordinary sand and gypsum plaster can be used.

Zonolite acoustical plastic is a pre-mixed material, which, after being soaked in water, can be troweled onto walls or ceilings. It will stick to any firm, clean, water-resistant surface. Existing architectural designs need not be sacrificed when acoustical plastic is used. Large areas can be efficiently and economically sound treated by the use of this material.

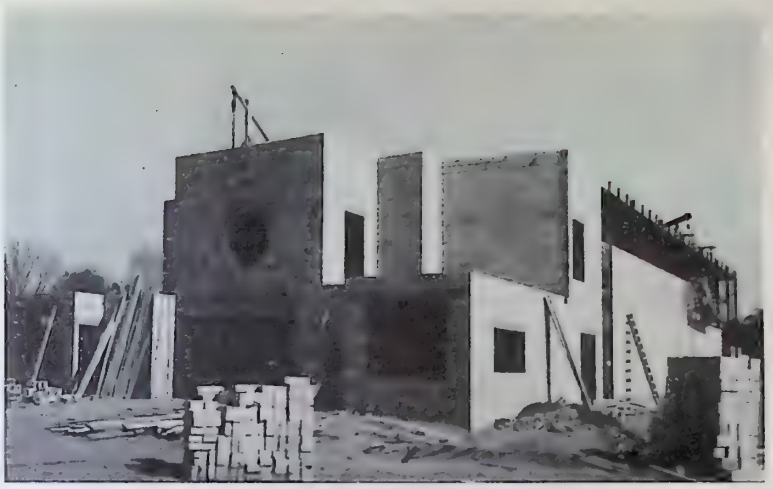
Zonolite insulating concrete is made by mixing a special grade of Zonolite (known as Zonolite stabilized concrete aggregate) with portland cement and water in the same manner that ordinary concrete is mixed. An integral water-proofing agent is added during the process of manufacture.

THE PIKE THEATRE

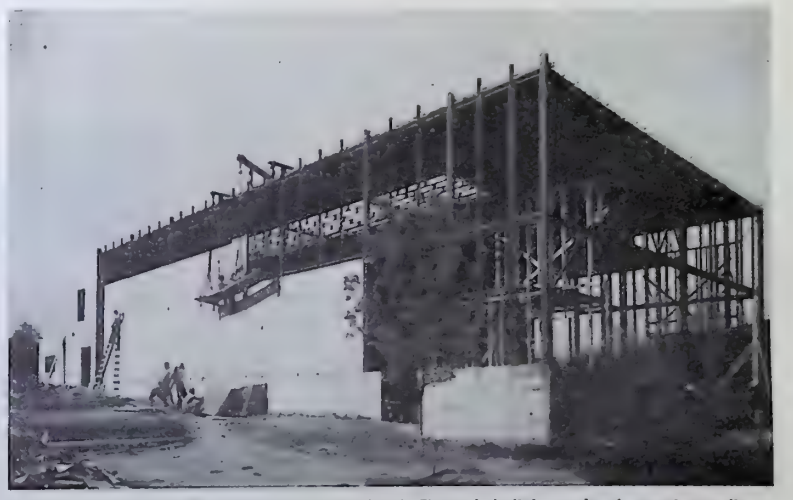
The type of construction, of which the Pike Theatre represents the first example, involves, as has been stated, a welded structural steel frame for the main auditorium and the stage, with the spaces filled in with pre-cast vermiculite slabs.

Construction

In this case the steel work was set within the space of the week. Inasmuch as this was a first-time ever, considerable time was spent in developing a technique for mounting the side walls and the rear wall. When all was done, and the way pointed for more efficiently performing the same job the next time, it is expected that the job can be done in two weeks, three at the very most.



PART OF THREE TIERS of the pre-cast vermiculite slabs have been set, as shown in the top picture, and the front section of the theatre shows a constructional advance over the preceding shot. Immediately below is a picture looking in the other direction at the theatre, taken at the same time as the preceding photograph. Here is shown the outside of that part of the theatre revealed in the first of this series. Two months more of construction.



GLEAMING IN THE SUNLIGHT of the first day of June, the Pike Theatre lacks little now but the premiere audience, and that came trooping in four days later. Architects on the project were Fred Manley Associates and the general contractor was Daugherty and Waters. The cost of the theatre building is said to be $50,000, with $20,000 worth of equipment added. The problems met and solved will no doubt subsequently result in more construction saving.

The vermiculite slabs, as used in the Pike Theatre, were composed of portland cement and vermiculite, 2½ inches thick, and weighing 10 pounds to the square foot, with an insulation value equal to 12 inches of brick masonry of the usual type. The slabs, 4 feet wide by 6 feet high, were bolted to the steel, and the erection was found to be easier than had been anticipated.

The joints between the slabs are calked, and the entire outside surface water-proofed with a material which has proved entirely satisfactory.

While of course the sapient architect would consider the matter, it has been pointed out that the sizes of the structural steel and the slabs vary with the conditions under which the building will be built. In Tennessee, for example, the snow load, according to charts of the American Standards Association, is only 15 pounds to the square foot, so this type of construction would naturally involve elements of different proportions where this factor was different.

The front portion, which sets back from the pike about 150 feet, is built along modern lines, with a concrete block, also water-proofed.

Notes on the Interior

The vermiculite slabs, being good thermal insulation as well as acoustical treatment, is all that is needed, and, accordingly, any decorative material is applied directly to the walls. The slabs, with their textured finish, can easily be decorated with a casein paint.

Since the steel frame is exposed in each bay, it should be painted, as was done at the Pike Theatre, to harmonize with the wall surface treatment.

Vermiculite and plaster were also used in the wall surface for the scrolls on each side of the proscenium.

The ceiling is of Celotex in large-size sheets, of 4x12 and 4x8 feet, at staggered intervals.

The lighting is from banked groups of lamps of different colors installed in a cove running down each wall of the auditorium. Through this arrangement, any combination of lighting is made possible by operators controlling it from the projection room. There are no central lighting fixtures in the auditorium ceiling.

The rest rooms, as well as the standee section, offices, and so forth, are all treated with vermiculite plaster, both for its acoustical value and for its insulation value.

There is no balcony in the Pike Theatre. Instead, some of the space on the second floor is taken up with a "crying room." This is a room with a plate-glass front facing the screen, in which mothers can take their fretful children, and see and hear without disturbing others. It is proving very popular.

Also on the second floor, there has been provided space for private groups to view the picture through a plate-glass window, and thus permit a party to enjoy the picture and also smoke, whisper, or even talk without disturbing the patrons. It is anticipated this will also prove a popular feature.

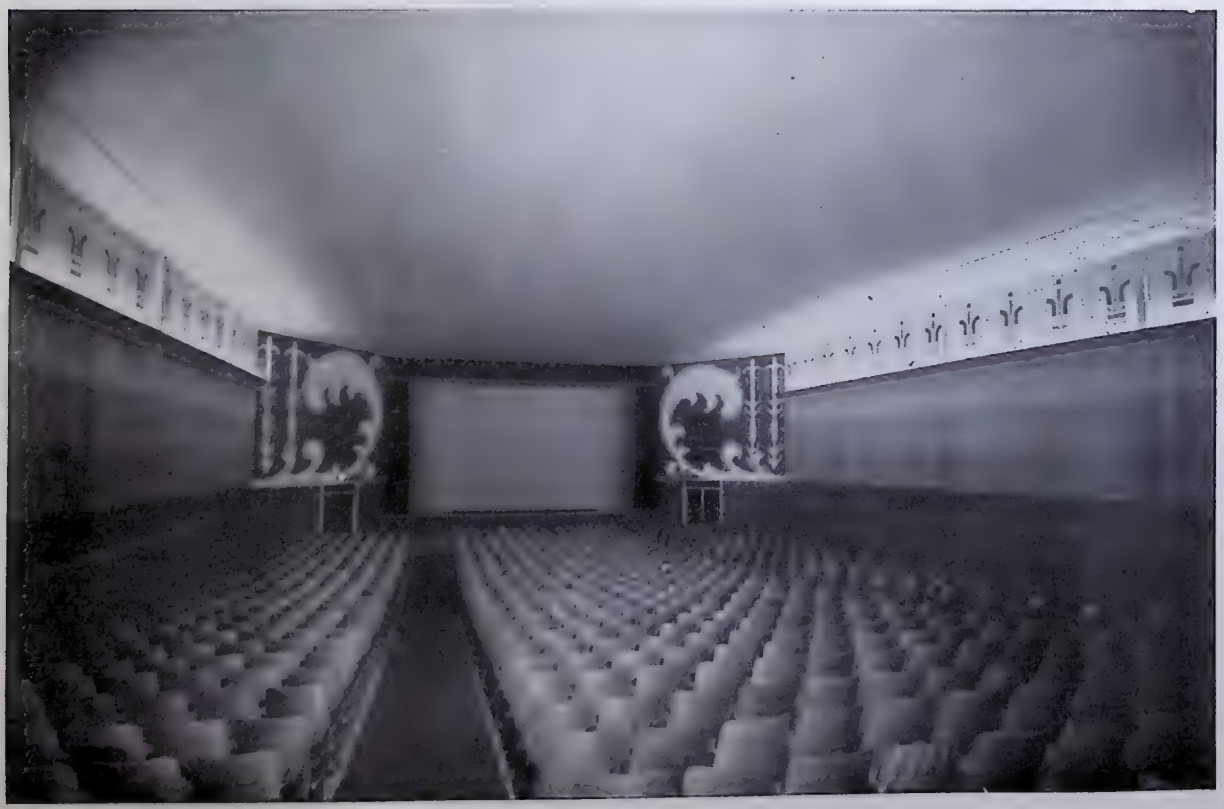
The Pike Theatre is without air conditioning, ventilation being supplied by blowers of conventional design, equipped with hydraulic controls. During the past summer, it was, however, not unusual that the management be requested to "please turn off the air conditioning." While many factors are at work, it is thought that the foliage of the surrounding trees is important in this unusual result.

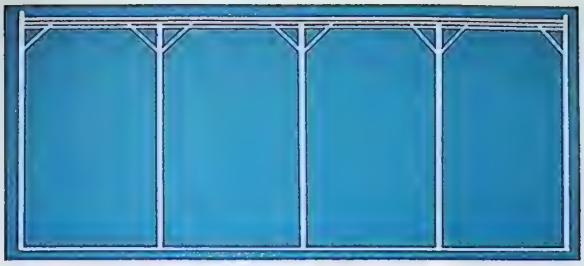
The present winter will tell the tale as to heating, provided by an oil-burning, hot-air furnace. The management, however, feels that at the Pike will be a situation comparable to its Lee Theatre, where 15 tons of coal is the maximum consumption. The theatre operates from 5:30 p.m. Monday through Friday and continuous on Saturdays and holidays, a schedule which saves the Sabbath heating.

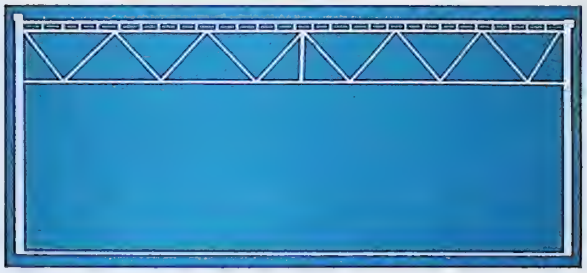
CONCLUSION

None of the pioneering steps taken in the construction of the Pike Theatre of structural steel and pre-cast vermiculite slabs has been disappointing, and the final cost—some 15 or 20 per cent less than a comparable cinema of traditional construction—indicates an economy superior to masonry. The problems met and solved in this theatre will lead to many improvements in subsequent constructions.

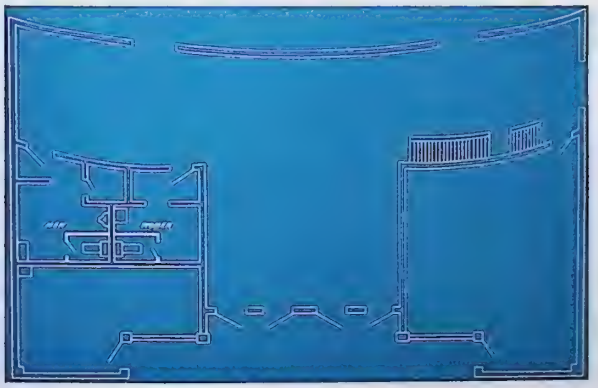
THE AUDITORIUM of the Pike Theatre shows how it can be decorated, even to taking advantage of the steel framework. Supplemental acoustic material is Celotex, Super-Rock blocks, and vermiculite plaster. Decorator was the Knoxville Scenic Studios. Pictures come on the Dalite screen through Simplex projectors, fitted with Strong Mogul lamps and RCA Photophone soundheads. Miscellaneous booth equipment is Neumade and Golde. Dominant colors of the interior are maroon, blue, and gold. The men's lounge is in green with ivory trim, while the ladies' lounge is in peach also with ivory trim. The 850-seat theatre will operate as a sub-run.



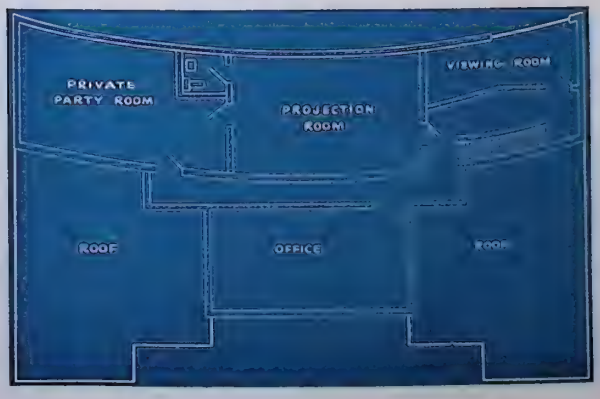


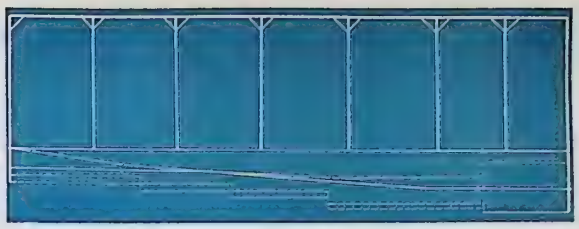


THE PLOT PLAN (right) looks to the distant future as well as to the immediate. With the theatre set back some 150 feet from the main highway, ample room is provided for making the development indeed a garden spot. Provided also is the space for stores when the neighborhood grows up, as well as ample parking space.



THE FLOOR PLAN of the Pike Theatre is as forthright in its simplicity as is the facade, so naive, in fact, that neither the blueprint nor the pictures reveal the presence of a box office! Perhaps the most interesting part of the layout is that right-hand store, occupied by the Pike Sweet Shop. From the floor plan, it will be noted that there is a door from this establishment into the promenade at the rear of the auditorium. It would take but little imagination to divide this store so that it could serve patrons from the theatre as well as the outside, with never the twain meeting, with the result that the Sweet Shop serves a dual purpose. Each side of the fire-proof projection room on the second floor is a viewing room, the one at left for private parties, on the right a creche for the convenience of mothers.

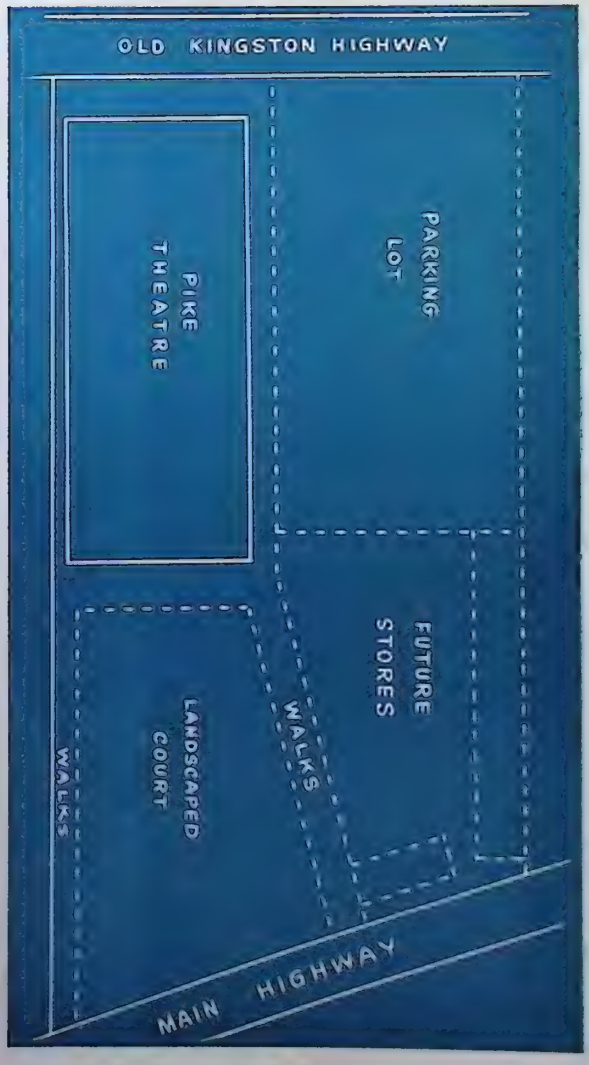




TYPICAL ELEVATION OF AUDITORIUM WALLS (upper right), showing the steel frame above the foundation wall and the footing elevations. The front section of the theatre is not shown in this drawing. The foyer (at the left end) is on a level with the top of the concrete footing. The solid descending line below this position indicates the present ground line, while the broken line just above it is the new auditorium grade. The fine broken lines at the lower right indicate the heater room.

TYPICAL SECTION (left), showing the positioning of the star brace between the trusses. As pointed out, feature of the method of construction lies in the use of pre-cast slabs of a special concrete composed of Portland cement and vermiculite. The latter is an expanded mica of high insulation value. These slabs, 2½ inches thick, are bolted to the steel frame and that is all there is to the side and rear walls, except for water-proofing paint outside and decorating inside later applied.

REAR ELEVATION (upper left). The columns are 16 feet on centers, with two angles back to back with legs standing between the joints of the pre-cast vermiculite slabs holding the slabs apart about ½ inch for caulking. These verticals (columns and angles) are made part of the decoration scheme, and the I-beam girder running lengthwise is used to support the cove for the indirect lighting. The theatre gets its bracing sideways through the depth of the 60-foot trusses bolted to columns.



Navy Point, Streamlined Community Center

New Florida Development Points the Way To a Unification of Communal Activities

FRANCIS B. JOHNSON
Owner-Manager of the Navy Point Theatre, Navy Point, Warrington, Florida

For a pictorial presentation of the Navy Point Theatre, the reader is referred to the photolithographic section of this edition.

Navy Point, one of the most remarkably beautiful of the present day multiple enterprise projects which are fast becoming the modern way of living, is located only seven miles from the heart of Pensacola, Florida. A subdivision of 750 homes and a population of 3,500, this exclusive residential district is situated on a four lane super highway adjacent to Warrington a city of 15,000.

DEVELOPMENT OF THE PROJECT

In order to begin our story of the birth and development of what is now Navy Point, we shall go back to the time of the Florida land boom in 1925-1926. At that time the present site was but a swampy wilderness, but like all other real estate in Florida, it was sold and resold, until its final ownership was vested in the Durschlag brothers of Chicago. It remained their property until sometime in 1942. Prior to this time there had always been an urgent need for a better class of housing for the steadily increasing naval personnel, particularly the officers.

It was at this time that L. B. Ellinor, Jr., came into the picture. Being a man of considerable foresight, as well as ample resources, he conceived the idea of purchasing this swampy wilderness, which was situated just across the bayou from the Naval Air Training Center, the largest of its kind in the United States. After negotiations for the purchase was completed, Ellinor immediatey conferred with the high-ranking Navy Officers and presented his plan to them. This consisted of first filling in the parts of the site that were low or swampy and then the construction of over 15 miles of paved streets, to complete the Navy Point network of thoroughfares, 3½ miles of which border the waterfront.

All was then in readiness for the construction of the 750 homes. The first foundation was laid on July 1, 1944, and the last was completed and occupied on June 31, 1945. Five million dollars comprised this initial investment in the construction of Navy Point homes and over 1500 persons were employed in the undertaking. A remarkable feature about the Navy Point homes is that no two of them are alike. Carefully planned and constructed of as many different types of quality material available, these homes present a marked contrast to the usual stereotype housing settlement.

The fact that this tremendous undertaking was accomplished in the midst of wartime conditions and shortages and without a cent of government money makes this achievement even more outstanding.

SHOPPING AND THE CINEMA

To eliminate the burdens of living is a prime essential in everyone's daily life and to that end the designers of Navy Point have climaxed their years of planning and construction with a mammoth final ovation, the most modern and complete shopping center in Florida ever to be put under one roof. Every necessity in present day routine available just a few steps from each other to save time, trouble and traveling expense.

For entertainment the beautiful new ultra-modern Navy Point Theatre is provided just a few paces from the modern shopping center and the super service station. Or if these responsibilities are removed from your list earlier, the family bus can be parked in either of the large paved and lighted parking areas adjacent to the theatre building. Without question, this ultra streamlined shopping center leaves nothing to be desired towards better living.

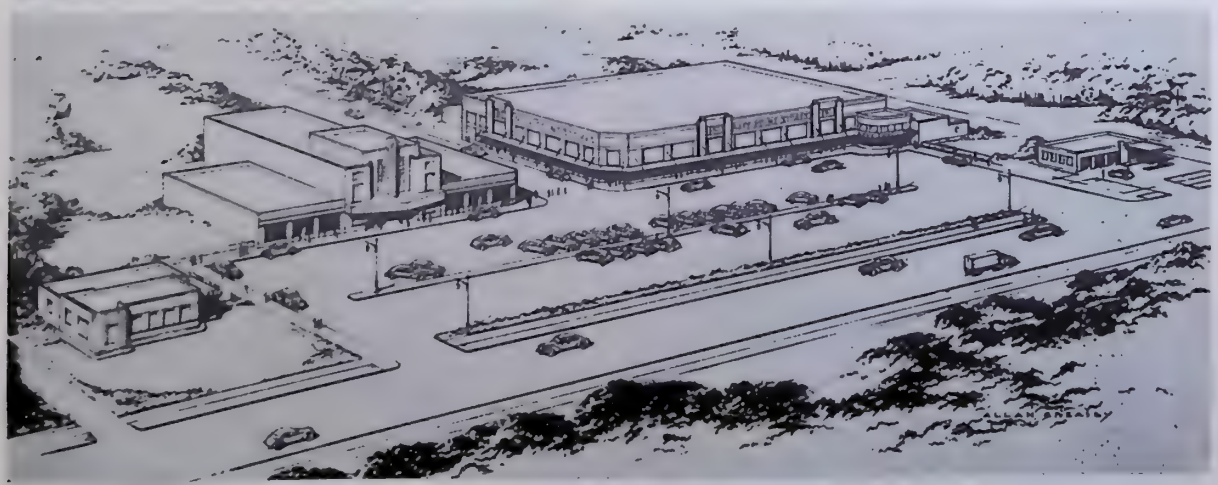
To the people of not only Navy Point but also those of nearby Warrington, Navy Point Theatre is a thoroughly appreciated asset. Up until its completion they had no similar place of amusement unless they went to Pensacola, a distance of seven miles. This made a very inconvenient arrangement for those who did not have cars, as riding the busses added additional expense to their entertainment budget. Then too, very frequently, if they went to a late show, it was not always possible to catch a returning bus late at night.

Inasmuch as this is intended for readers whose primary interest is the theatre, we will attempt to show the relationship of this complete shopping center and the part the theatre plays in such an enterprise.

THE NAVY POINT THEATRE

The Navy Point theatre was designed by Harry Pembleton, of Birmingham, Alabama, and was built at a cost of

THE COMMERCIAL CENTER OF NAVY POINT, as sketched by the artist, reveals, left to right, the development's real estate office, the Navy Point Theatre and adjoining stores, the merchandise mart, and the service station, all facing an ample off-street parking area. In the development of the business section of Navy Point, an effort was made to bring every necessity in the residents' daily routine within a few steps of one another. The center is designed to accommodate about 3,500 (1,000 families), in more than 700 homes. Fifteen miles of paved street (3-¾ miles of which border the waterfront) are included in manifold conveniences of project.



$150,000. It is completely fire-proofed and air-conditioned. The building itself is constructed of brick, concrete, and steel. The facade is faced in Italian Barrisina marble and stucco.

The marquee facing and sign carries out the Navy color scheme, being painted in blue, gold (yellow), and just a touch of red to set it off. The soffit of the marquee is lighted by numerous fluorescent lights. We enter the lobby through any of the eight entrance doors.

The walls of the lobby and foyer are finished in maple panels, with a natural finish. These walls resemble a fine piece of furniture in their finish as they were hand rubbed between each coat of varnish and in the final finish were rubbed with oil and pumice to attain a beautiful velvet-like finish. Also occupying a very prominent place in the lobby is a spacious concession, properly equipped and having a marble serving counter both in the lobby and on the street, so that patrons can be served from both places at the same time.

Off the foyer, are the ladies powder room and lounge. This is fitted with individual make-up tables and modernistic chairs. The carpet has a blue floral pattern.

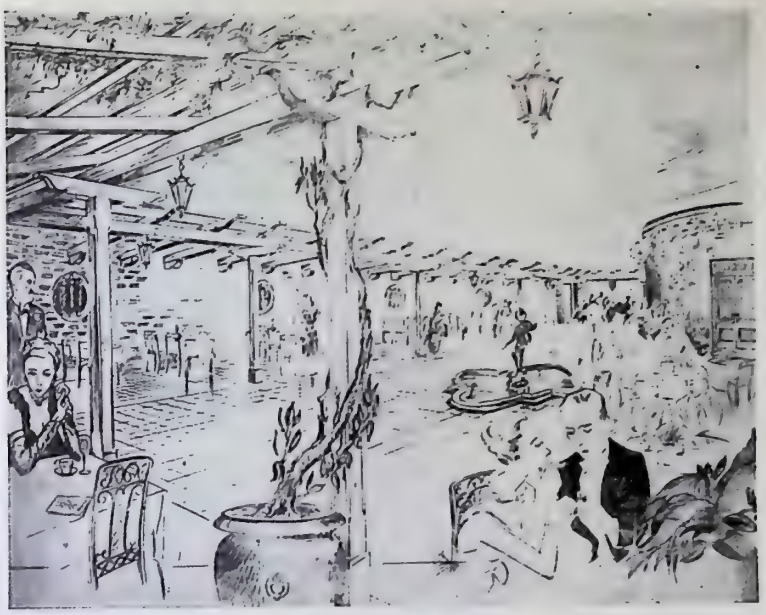
Continuing on our way into the foyer, we find the same beautifully finished walls plus the deep pile, Wilton carpeted floor. It is at this point that we get our first glimpse of the luxurious drapes adorning the standee area. These are of a rich maroon velour. The drape over the standee opening is made in such a way that it touches the floor, making a very modernly, rich appearance. The lighting for this area is of the new indirect cove lighting, which casts a soft glowing light over the whole foyer.

From here we continue on into the auditorium, which is finished very modernistically, the walls being perfectly plain and finished in large Celotex sheets of soundboard. The cool air from the air-conditioning is distributed evenly and uniformly through the use of air diffusers. The seats are fully upholstered and finished in blue with coral colored mohair backs. The carpeting in the aisles is the same pattern as is in the foyer.

The stage drapes make a fitting climax for the auditorium. The grand drape or outer curtain is of rich maroon velour. The valance over this curtain is of the same material trimmed with an 8-inch gold fringe. The bottom of the curtain has an 8-inch gold band and then the same gold fringe on the valance. Behind this on each side are the side legs of royal blue trimmed in gold. Just in front of the screen is the screen curtain and is of gold velour.

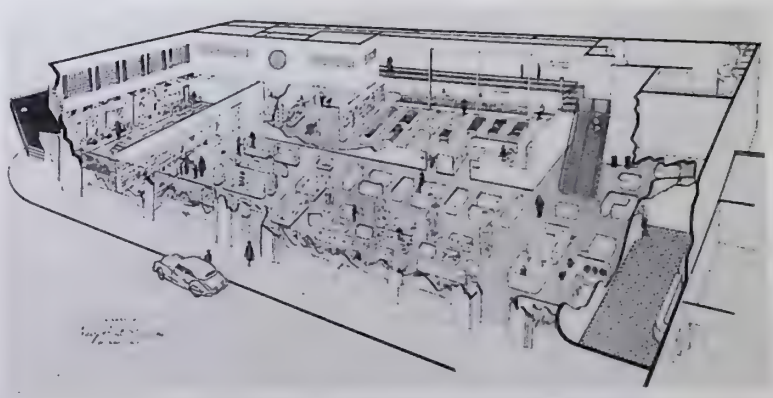
Another innovation to be found in Navy Point Theatre is the cry room. This is the only one of its kind in this section, Pensacola included. So far it has proved to be one of the most popular spots in the theatre, indicative that the mothers appreciate this added cenvenience in the theatre.

Last, but most important, is the projection booth. It is larger than most booths and is also air-conditioned for the comfort of the operator. It is equipped with Motiograph projectors and Motiograph's Mirrophonic sound system with Altec Lansing's Voice of the Theatre speaker system.



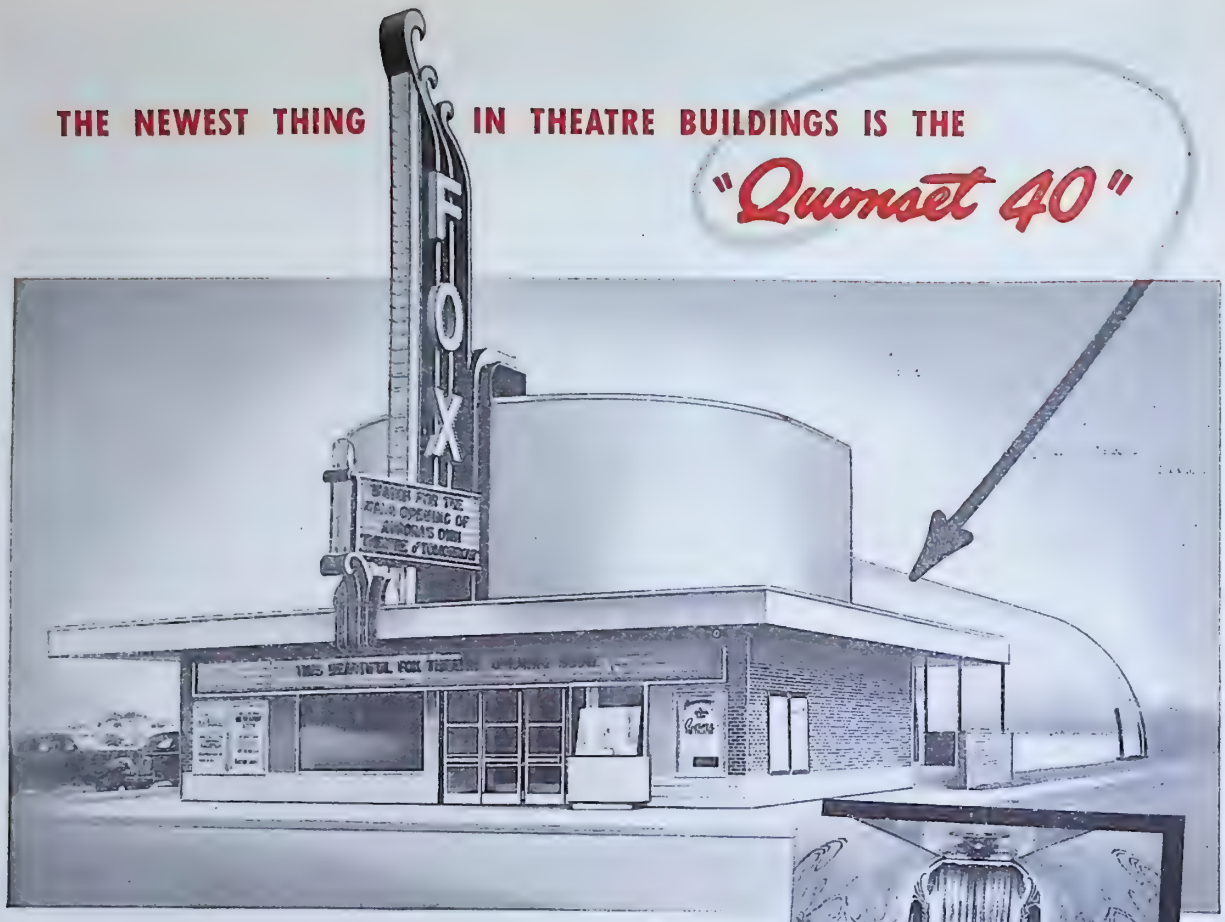
THE PATIO OF NAVY POINT STORES offers a pleasing blend of the sidewalk cafes of the Champs Elysees and a swank spot for wining and dining. Complete with fountain, and open to sky, the patio offers, during the afternoons and on star-lit nights, a pleasant place for relaxation. In association with the Patio is the Patio Grill where meals are served in comfortably upholstered booths. And, of course, with all there is a luxurious cocktail lounge.

CUTAWAY VIEW OF THE MAIN FLOOR of the Navy Point Stores reveals how well the convenience of the customer was kept in mind in the devising of the layout. It is not necessary for the customer to leave the store during the entire course of shopping. Included are a super-market, a bakery and delicatessen, drug store, barber shop, beauty shop, cosmetic shop, linen shop, women's wear shop, shoe repair shop, men's and boys' shop, and florist.



INTERIOR VIEW of the cocktail lounge shows a corner bar. The indirect cove lighting adds further enchantment to the circular seat, which is finished in leatherette white upholstry with spring construction. Walls are covered in silver and gold leaf on a blue background. Throughout the development are comfort, convenience, and service. In the photolithographic section of this volume will be found a picture presentation of the Navy Point Theatre.

THE NEWEST THING IN THEATRE BUILDINGS IS THE "Quonset 40"



The beautiful new Fox Theatre at Aurora, Colorado

Here is the "theatre of tomorrow" . . . architecturally beautiful, efficient in design, the last word in entertainment luxury. Here, too, is a development most significant to every film exhibitor . . . the adaptation of the "Quonset 40" to the theatre industry!

The "Quonset 40"—40 feet wide by any desired length—is a substantial, economical *basic* building of remarkable versatility. Because it lends itself so well to the use of additional building materials, the "Quonset 40" has almost limitless possibilities for artistic, appealing interiors and smart, modern facades. Critical materials can be held to a surprising minimum. And, of course, the steel-on-steel "Quonset" construction provides the obvious advantages of fire-resistance, long life and inexpensive maintenance.

Other "theatres of tomorrow"—also adaptations of the "Quonset 40"—are already operating in many sections of the country. If you plan to erect a theatre, be sure you get the full "Quonset" story first.

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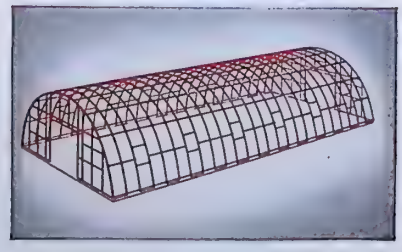


STRAN-STEEL—FRAMING MATERIAL OF THE "QUONSET"

The flexibility and economy of the "Quonset" lie in its Stran-Steel frame. Stran-Steel members feature the patented nailing groove, which permits other building materials to be nailed directly to the frame. This type of construction is fast, rigid and permanent. It has been used for more than 12 years in apartments, homes, stores and similar buildings . . . and, more recently, in tens of thousands of military "Quonsets."

YOU NAIL TO STRAN-STEEL FRAMING

SECTION 2

EQUIPMENT

SECTION

FRONT and LOBBY

1946-47

The Facts of Cold-Cathode Sign Lighting

Tube and Bulb Light Sources Are Examined In Determining Relative Values and Costs

A. P. Trucksess and H. R. Maier
Respectively, Philadelphia Sign Company and Warner Brothers Circuit Management Corporation

This is a report of certain comparative tests made on different types of light sources for the illumination of glass surfaces as used in theatre marquee signs in front of which, opaque and translucent interchangeable letters are placed.

Two sign boxes were constructed and equipped with Wagner frames, as generally used, for the support of the glass and letters. These were fitted in the front of the sign box under the same conditions as used in typical marquee installations.

One box measured 28 inches wide, 41 inches high and 6½ inches deep to the receptacle mounting plate. The mounting plate was equipped with 18 lamp receptacles, evenly spaced over the area, as has been found to be good practice after years of development. In the tests, 25-watt lamps were used in the receptacles as representing the degree of illumination that is satisfactory for installations made in dark areas with little competition for attention. Forty-watt lamps were used representing a satisfactory illumination for highly illuminated and competitive locations.

THE CONTRAST of an incandescent lamp and socket and a cold-cathode tube and its socket is noted in this picture. Note especially the length of the cold-cathode socket, which will necessitate greater depth in the sign box. These two types of lamps are samples of kind of equipment utilized in making the study on the relative merits of cold-cathode lighting and incandescent bulbs in providing the illumination for marquees and other outside lighting.

Another box was constructed as 23¾ inches wide, 41 inches high and 6¾ inches deep with a similar glass face, but equipped with three cold cathode U-tubes. These were so designed as to be arranged vertically in the box 4 inches from the center of one tube to the center of another tube. Three sets of U-tubes were made of 3500 degree white tubing and electrodes, as manufactured by the Colorescent Laboratories, Newark, New Jersey. They were processed by an experienced man. The three sizes were: 15-mm. tubing at 7½-mm. pressure, 20-mm. tubing at 6-mm. pressure, and 25-mm. tubing at 4-mm. pressure.

This box was also equipped with one transformer to be used with the 20-mm. and 25-mm. tubing. This was a 12,000-volt, 120-m.a., power-factor type, manufactured by Acme. The other was a 15,000-volt, 60-m.a. regular transformer, manufactured by Reco. All tubes were made to be placed in the box so that 3½ inches existed between the back of the glass face and the front of each tube. Both boxes were painted on the interior white enamel. All tubes were new, having burned no more than 24 hours.

The glass frames were equipped with two types of glass. One was ⅛-inch pot opal as manufactured by Wissmach, and in general use for this purpose. The other was ⅛-inch flashed opal, manufacturer unknown, but also generally used for this purpose.

The tests were made in a darkened room, not totally blacked out, but not enough light to register on the light meter, which was a General Electric. The temperature of the room was 60 degrees. The schedule in Table 1 of readings in foot candles were obtained under the several conditions as shown on the schedule. No corrections have been made by a multiplying factor between the incandescent lamps and the fluorescent tubes. All readings were taken at the center of the glass faces.

Readings were also taken after the glass faces were removed, exposing the light sources directly to the meter. The schedule in Table 2 shows results. They have no direct bearing on the problem at hand, but are of interest.

Further tests were made, and it was determined that at least 2¼ inches between the back of the glass and the face of the tube was necessary to avoid tube images appearing on the glass. This was true of both types of glass, and also in the several diameter tubes.

An analysis of the tests made on November 6 would seem to indicate that the use of cold cathode tubes as a light

TABLE 1. Summary of the technical data on the tubes (and transformers) and lamps used in the tests herein described.

	TUBES (120 MA TRANSFORMER)		TUBES (60 MA TRANSFORMER)		LAMPS		LAMPS			
Type of Glass	Opal	Flashed	Opal	Flashed	Opal	Flashed	Opal	Flashed	Opal	Flashed
Light Source	25-mm.	25-mm.	20-mm.	20-mm.	15-mm.	15-mm.	25-watt	25-watt	40-watt	40-watt
Reading Glass Surface	200	320	230	305	170	225	175	220	275	350
Reading 12 inches from Glass	125	180	140	175	95	130	100	140	175	200

source for theatre marquee lighting is reasonably satisfactory in the 25-mm. size when used in conjunction with flashed opal glass. Three hundred and twenty foot candles on the glass surface compares favorably with 350 foot candles as obtained with 40-watt lamps, using flashed opal.

The previous tests having been taken at a room temperature of 60 degrees, it was then desirable to know how efficiently these tubes would operate at lower temperatures, particularly those encountered in these latitudes in winter. As a consequence, arrangements were made with the University of Pennsylvania for certain tests to be made in their refrigerating plant. These tests were conducted on November 19.

The sign box, containing three cold-cathode U-tubes, 25-mm., operating at 120 m.a., was taken to the Thermo-Dynamics Research Laboratory and placed in the cold box. This sign box was equipped with flashed opal and represented the most efficient comparison as determined by the previous test. A thermometer was placed outside the sign box, representing the temperature of the room, and another thermometer was placed inside the box to give the temperature of the tube compartment. Readings were taken with the same light meter as used before directly on the surface of the glass.

The schedule in Table 3 gives the several temperatures and foot candles.

At 70 degrees low temperature starting was tried. Instant starting resulted even after the box had remained unlit for some time.

CONCLUSIONS

Therefore, it appears to us, from both tests conducted, that cold cathode lighting is an appropriate lighting for marquee illumination back of glass. That 25-mm. tubes in conjunction with 120 m.a. transformers back of flashed opal compares favorably with previous standards of illumination resulting from incandescent lamps. That there is a definite decrease in illumination when these tubes are subjected to cold. That winter temperatures ranging from 28 degrees to 43 degrees result in very little decrease, but that from 5 degrees to 25 degrees the decline is sharp, but resulting in the reduction of only approximately one-third in the lower brackets. While no tests were made with incandescent lamps, it is generally known that they are not seriously affected by these temperatures.

The esthetic effect of cold cathode lighting, in our opinion, is superior to incandescent lights. The almost pure white effect of the illuminated glass surface is much more striking and vivid than the ivory or cream effect that exists with incandescent lamps.

It is evident that the initial cost of cold cathode lighting is much in excess of an incandescent lamp installation; that cold cathode lighting consumes very much less current than incandescent lamps, and the life of cold cathode tubes is a minimum of 10,000 hours average, and incandescent lamps have a life of only approximately 1,000 hours. Cold cathode lighting, because of the necessity of series operation, results in a considerable portion of the sign being out when only one tube becomes inoperative, whereas, if an incandescent lamp becomes inoperative, it darkens only a small portion of the glass surface. In the matter of servicing, requirements are about equal if a number of spare tubes are always kept on the theatre premises for replacement when required.

THE TEST BOXES IN OPERATION. These photographs made on 4x5 Isopan film (Ansco); lens 6-3/8 inches, Zeiss f/4.5 Tessar, Compur shutter. Exposure f/32, 1 second, supplemented by a single No. 0 Wabash photoflash, diffused to give suggestion of outline of box. At 10 feet, this flash is insufficient to give a printable record under normal condition, used solely for fill-in. All illumination furnished by box itself. Film developed normally in Ansco 17. Print on Kodabromide glossy F-3, exposed and developed identically (at same time) in Dektol. Exposure in enlarger 15 seconds, f/11, 6-inch Goertz Dagor lens. Enlarger is an Saltzman 5x7.

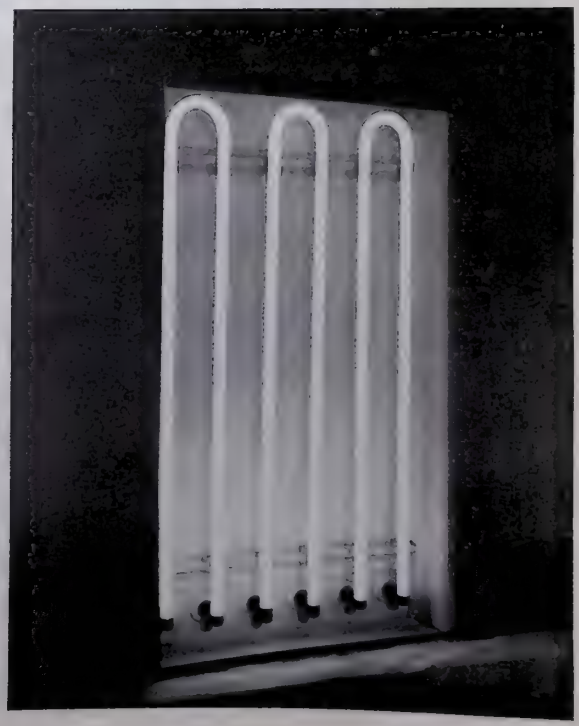


TABLE 2—Exposure meter results during the tests.

Distance from Light Source	Light Source				
	25MM	20MM	15MM	25W	40W
3½ inches...	500	460	350	310	500
15½ inches...	275	275	200	175	325
63½ inches...	43	40	25	38	50

There are advantages and disadvantages with both systems of lighting. The plus and minus characteristics of each type approximately counterbalance those of the other.

The question seems to be whether the additional cost of a cold cathode lighting installation warrants the savings of current and service, plus its greater esthetic value. We will undertake to analyze these factors further.

ANALYSIS OF COSTS

We will undertake to analyze the comparative current costs of cold cathode tubes, as described above, and the conventional lamps.

The 25-mm. tubes, arranged at 4-inch centers, vertically, by a succession of U tubes, develops to approximately 32 watts per square foot of glass area. An average marquee job, having three lines of lettering and 60 lineal feet of glass surface, takes approximately 6.7 K.W.

Using the present system of lighting, or incandescent lamps, we get:

25-watt size, 52 watts square foot, or 11.9 K.W.

40-watt size, 82 watts square foot, or 17.2 K.W.

Average of the above, 14 K.W.

It can readily be seen that the difference between 6.7 K.W. and the average of 14 K.W. would seem to indicate an average saving of 7.3 K.W. for the use of cold cathode lamps.

In the Philadelphia area, any saving in current would be from the last brackets of the tariff, which range from 0.47 cents to 1.6 cents a K.W. hour, depending upon the contract made with the Utility. One cent a K.W. hour is probably a fair average.

Developing this 7.3 K.W. saving of cold cathode to a yearly dollar basis, we get $132.86 a year, based on this portion of the marquee burning from dusk to midnight. Higher current rates that might be encountered in other areas, and longer burning time, would naturally increase this amount.

Incandescent lamp replacements based on 1,000-hour life would amount to approximately $91.80 a year.

Cold cathode tubes have a life of 8,000 to 10,000 hours. They are guaranteed for one year. At 2,000 burning hours a year, this would develop into four-year life, but it would seem that any calculation on replacements should be made on the basis of three years, as the tubes will darken toward the end of their life and will not be near as efficient as in the earlier portion. The yearly cost of replacement of cold cathode lamps in the average job described above would approximate $100 more than the incandescent lamp installation, which nearly wipes out the current saving of cold cathode.

From these figures, it would seem that cold cathode does not develop the tremendous savings that would appear on the surface, that the original installation costs considerable more, but that, in our opinion, the esthetic value of this type of lighting is an improvement over incandescent lamps.

These are the conclusions as of today. The development of cold cathode lighting is advancing rapidly, and the picture is changing continually. Tests made by us four years ago, similar to those now conducted, did not develop near the favorable aspects as those made now.

TABLE 3—Schedule of temperatures and foot candles found during the tests.

Temperatures (Fahrenheit) Outside Sign Box	Inside Sign Box	Foot Candle Reading on Glass Surface
50	68	300
43	64	300
41	61	300
35	58	300
31	52	290
28	44	280
25	42	260
21	39	250
17	29	230
13	25	200
5	20	170

ONE OF THE UNLIGHTED TEST BOXES is shown here. The facing is of opal glass. Light meter readings were made at the front of the glass in both lighted tests. In construction, the box simulated a theatre marquee, even to the letters and the associated equipment, as completely as possible under the laboratory test conditions. Essential fact of the study was that cold-cathode marquee lighting does not develop the tremendous savings expected.

A Review of the Use of Signs and Letters

Pictorial Presentations of Installations Showing the Trend in Modern Front Design

First appearances being lasting ones, one of the major considerations in theatre design is the facade, and particularly the marquee, which, of course, includes signs and letters. While on the interior a designer's fancy may be given free rein, the outside must be considered not only from the standpoint of a definite building in a definite community, but also that of advertising and the enticement of potential patrons.

There can, naturally, be no hard and fast set of rules by which this blending of civic fitness and theatre functionalism can be achieved, each situation must be faced individually and its problems solved in the best possible manner. Among the considerations entering the solution of the problems of the facade are those of the site of the theatre in relation to the position of the house in the exhibition setup of the area and to the community as a whole.

In these six pages an attempt has been made to show a wide variety of theatre fronts, with divers ideas expressed concerning marquee shape and lighting and the use of modern, silhouette or translucent letters. The pictures all represent modern ideas in display signs and the utilization of the products of three top-ranking manufacturers.

The photographs on this and the following page are presented through the courtesy of the Adler Silhouette Letter Company.

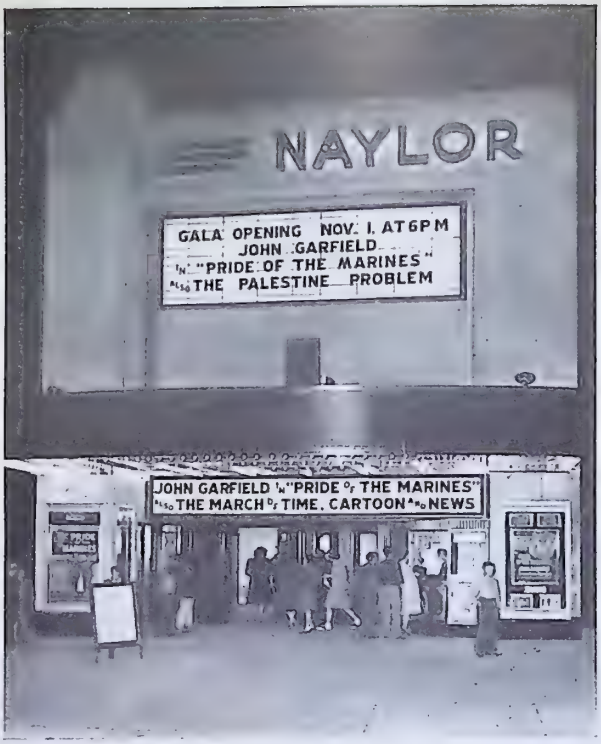
THE ELMWOOD THEATRE, Elmhurst, on New York's Long Island, has a marquee with round corners, and shows 10-inch and 16-inch Third Dimension letters, used interchangeably on a four-line Remova-Panel Glass-in-Frame units. Here the greater display is made on the street side of the marquee. Plenty of space is available.

LOEW'S STATE THEATRE, Newark, New Jersey, shows the program display in 24-inch and 10-inch Third Dimension Letters, used interchangeably, in the Remova-Panel Glass-in-Frame units. The design of the marquee, being nearly square, allows generous program space on three sides, with the biggest display on the street side.

THE RKO GRAND THEATRE, Chicago, Illinois, utilizes on its marquee program boards—and there are three of generous proportions—two sizes of Third Dimension letters mounted on Remova-Panel Glass-in-Frame window-type units. The sign over the entrance also makes use of letters mounted on the same kind of panels.

THE RKO GRAND THEATRE, Chicago, Illinois also utilizes two sizes of Third Dimension letters on Remova-Panel Glass-in-Frame units on the exit side of the main-entrance doors for announcing to the departing patrons such salient details on the coming attraction as the stars who will be seen and the title of the production.

THE WEIS THEATRE, Savannah, Georgia, shows 10-inch and 16-inch Third Dimension letters, used interchangeably, on Remova-Panel Glass-in-Frame units. The two end openings are with six lines and are 85 inches high. One of the openings is curved, the other straight. Ample display space is obtained in both the signs.


NAYLOR
GALA OPENING NOV. 1 AT 6 P.M.
JOHN GARFIELD
IN "PRIDE OF THE MARINES"
ALSO THE PALESTINE PROBLEM
JOHN GARFIELD IN "PRIDE OF THE MARINES"
ALSO THE MARCH OF TIME, CARTOON AND NEWS

THE NAYLOR THEATRE, Washington, District of Columbia, has its sign inserted into the front of the building. A five-line stainless steel Remova-Panel Glass-in-Frame unit, holding 10-inch Third Dimension letters, is employed. Note also the sign under the marquee, holding two lines of 10-inch letters of the same manufacture.

THE BOULEVARD THEATRE, Wichita, Kansas, shows 24-inch and 10-inch Third Dimension letters, used interchangeably, on Remova-Panel Glass-in-Frame units on the front face of the sign that is set about 30 feet in front of the theatre and suspended between pillars. Front shows current attraction, the back those coming.

THE AVON THEATRE, Savannah, Georgia, a Paramount affiliate, shows, on its marquee, 10-inch and 16-inch Third Dimension Letters, used interchangeably, on curved Glass-in-Frame units. The marquee is semicircular in shape, but, with the curvature partly continuing into the entrance doors, give the impression of a circular foyer.

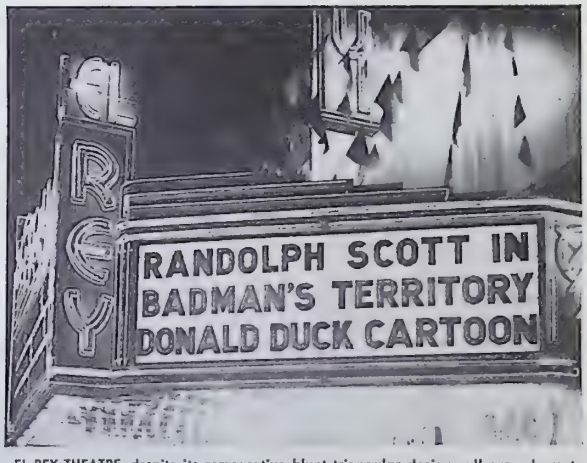
Most recent entrant in the field of sign letters is Theatre Specialties, Inc., whose Bevelite letters have been design of plastic in such a manner as to give a ribbed, beveled appearance, this third dimensional effect being particularly noticeable when the background glass is illuminated.

The Bevelite letters are made of a plastic translucent material, known as butyrate thermoplastic, a product of the Tennessee Eastman Corporation. The material is tough and is claimed to be the best of the plastics for use outside against the elements, for it stands temperatures of sub-zero to above 160 degrees. The construction of the letters' center webbing enforces it against both breakage and warpage. By utilizing the lug method of fastening, the rigidity of the letter is not affected. The letters come in several different colors.

The photographs on this and the following page, including the "before" pictures, have been provided through the courtesy of Theatre Specialties, Inc.

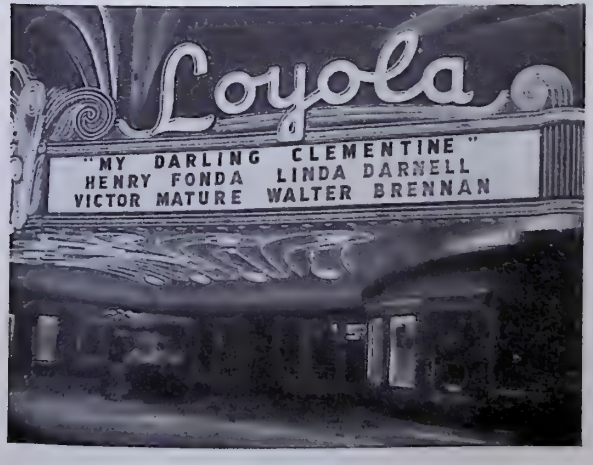
EL CAJON THEATRE was designed without the traditional marquee, but, instead, with out-size twin program boards erected over the sidewalk as an integral part of the facade. Utilizing Bevelite letters, there is plenty of room to give notice of the parking lot's location, along with the titles and principal players in the day's two attractions, as well as the fact that a cartoon and a newsreel is also included in the current program.

A DRIVE-IN THEATRE may also utilize the Bevelite letters. The available space on the back of the screen tower permits an even greater display of wordage than is possible with the more orthodox theatre marquee. And before opening, the space may be used for plugging various items of theatre equipment installed.



EL REY THEATRE, despite its comparative blunt triangular design, allows adequate space for the display of the current attraction, even including, in this case, the fact that, on the same program is a short-subject character of popular appeal. The bevel effect of the Bevelite letters is well shown in this picture of the marquee.

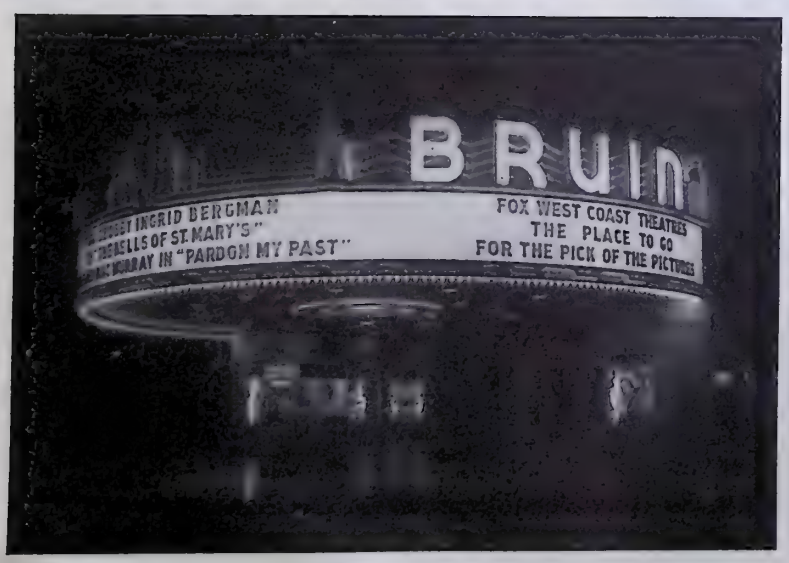
THE LOYOLA THEATRE, with its expansive marquee, made even more so by the fact that the suffit lighting continues to the rear of the box-office area to the entrance doors, can utilize on its triangular marquee relatively long lines of Bevelite letters in translucent plastic. The title words are in one color, the cast in another.



THE LOMA THEATRE has a wide triangular marquee which encompasses in its width the flanking stores as well as the entrance to the theatre proper. This expanse gives a long stretch over the sidewalk, allowing room for Beveliting the titles and casts of the two features. Theatre information is on the truncated tip.

THE SENATOR THEATRE shows the use of the new type of letter, constructed to give a beveled, third-dimensional appearance. In the before and after pictures is shown the changes that can be effected in the front of a theatre by merely changing the type of marquee sign from the old-time glass letters to the modern letter of the silhouette type—and even more modern by selecting letters of translucent plastic.

THE MALCO THEATRE, Hot Springs, Arkansas, in a remodeling, reconstructed the facade and built a marquee of more cinematic aspect, the while changing only the brand of silhouette letter. The marquee not only gives the Malco more billing space—to add the line about the newsreel—but it adds light to the theatre front, and, thereby, creating a greater attraction for the passerby in search of entertainment.



THE BRUIN THEATRE is another cinema which affected a more or less complete change of aspect by simply changing the type of program board and installing Bevelite letters. The circular marquee is lettered in three sections which may be enlarged or reduced in width to accommodate any amount of copy, either for attractions or for the institutional promotion of the theatre's interests in the community.

Manufacturers of letters for theatre signs do not, as a rule, make the signs or attraction boards, these being purchased through the sign man of choice. When signs are designed and built to utilize multiple-size changeable letters, a new message can be displayed every day, adding a powerful point-of-sale advertising force both day and night. There can be displayed special items and prices, services, and attractions.

Changing copy is simplicity itself, taking but a few seconds to change yesterday's advertising message into today's new and freshly interesting one. With a variety of styles and sizes of letters available, it is possible to display signs that shout and possess appealing eye-interest.

Color is easily injected into such displays as an added force by the use of translucent plastic letters. Persons and scenes can also be employed through the use of full-color transparencies.

Another display variation is the use of word units. These units consist of miniature frames easily mounted on the standard bar spacing provided on the sign. Such units save space, permit the better use of space, and make word plates unnecessary. The units are flexible, with the 4-inch letters staggered on three lines or two as desired, or two straight lines within the space usually occupied with a single 10-inch letter.

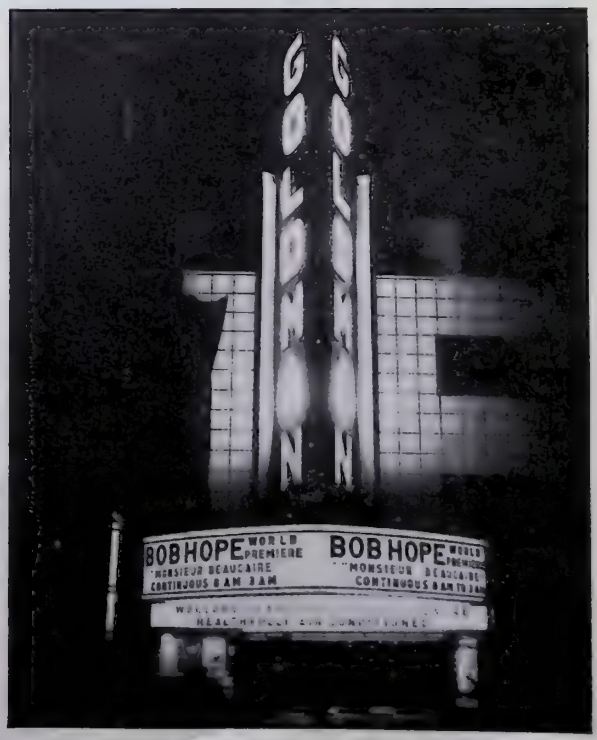
Letters used in lobby display units form an effective medium for selling coming attractions to out-going patrons.

The photographs on this and the following page have been provided through the courtesy of Wagner Sign Service, Inc.

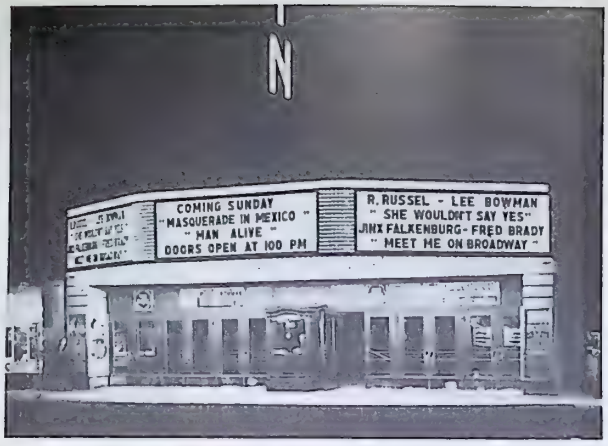
THE LYRIC THEATRE, Salt Lake City, Utah, with program boards filling the two long sides of a triangular marquee, takes advantage of the maximum size of letters (here they are of the translucent plastic type) to list the title and principal players en masse of the premiere attraction and the title of the supporting picture on the double bill. Some space on the program boards is saved by the use of smaller letters in form of word blocks.

THE GRANADA THEATRE used its marquee sign not only for announcing the feature attraction and its principal players, but also to point out the availability of parking facilities, an adjunct of operation which not infrequently may determine a decision on patronizing a particular theatre where the choice is a toss-up.

THE GOLDMAN THEATRE, Philadelphia, Pennsylvania, boasts a semicircular marquee, so designed as to be used as a two-sided program, with supplemental advertising space beneath the marquee. An ample depth of marquee permits a varying use of letters of different heights. Below the marquee is a house advertisement.

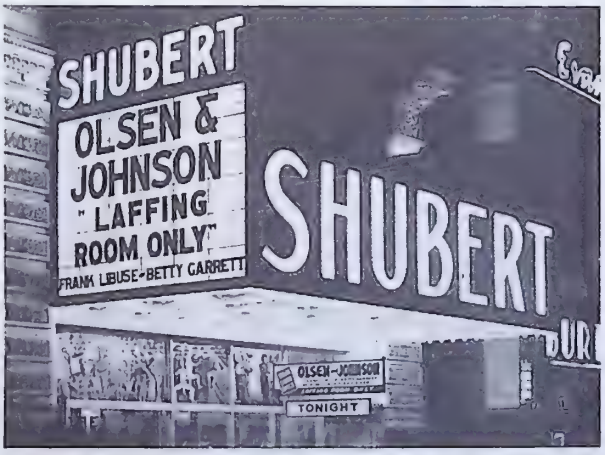


THE TIFFIN THEATRE, a neighborhood house operated by Balaban and Katz, has a marquee sign with three openings, two of which are 16 feet 1 inch by 4 feet 9 inches and the third 15 feet by 4 feet 9 inches. Here again is ample space for the display of the day's dual attractions, as well as the feature that is coming next.



THE SHERIDAN THEATRE, Chicago, Illinois, is an Essaness neighborhood. Here the window-type frame opening is 44 feet 8 inches long by 4 feet 7 inches deep. The space allows a maximum display of the current attractions on both stage and screen, utilizing a large-size letter for accentuating the titles of both the features.

THE COSMO THEATRE, with its triangular marquee, offers wide expanses of program-listing space. Here translucent colored letters are used, and, to set off the supporting feature, Flex-Word units are employed. Besides "Also" and "In" other units are available for adding more interest and attractiveness to the whole board.



THE SHUBERT THEATRE reveals that a so-called legitimate theatre may also utilize to good advantage. Using only the end portions—but with extra width to compensate for the lack of width—the effect of the signwork is heightened by the use of letters in three sizes, to give the stars, title, and support proper distinction.

THE MARCY THEATRE, located on a corner, possesses a marquee with four program boards, one over the sidewalk on each side, for posting current attractions, and one facing each of the streets, for announcement of the next show, with a neon name on the rounded corner. Sign letters are of the translucent plastic type.

THE ASTER THEATRE also employs the translucent, colored, plastic changeable letters, with a generous space for the display of the titles of the day's double bill, and even allowing a third line for an advertising catch-line for the main feature. Note also that smaller size letters have been utilized for the two word plates.

Notes on Care of Sign Letters and Bulbs

Some Suggestions for Enduring Long Life Set Forth in Three Series of Photographs

Cleanliness, while it may be next to godliness, has, to the theatre operator, a significance of much more immediate import, especially when that cleanliness is applied to sign letters.

Manufacturers, supply dealers, and up-and-coming theatre owners are one in the opinion that the shortest cut to economical operation is by taking thoughtful care of all equipment as a matter of routine procedure. Many times this consideration to equipment is known only indirectly to the patron and only after he has purchased his ticket and entered the theatre.

Sign letters in particular and the whole signwork in general, however, can be observed by all and actually is, since, by their very nature, it is virtually impossible to pass a theatre without looking to see what is playing. Accordingly, every one, whether a patron or not, sees the marquee and its sign letters and, in his own mind, forms an idea of the theatre by the impression given by the condition of what he sees.

If the marquee literally sparkles under the daytime sun or shines forth in the effulgence of its own illumination at night, then the passerby feels assured that inside is the type of theatre he prefers to patronize for sheer enjoyment. But, on the other hand, if the letters and the marquee itself is marred and badly wants a coat of paint, if the letters are broken or a makeshift is utilized, there is no choice but to feel that the particular house is sloppily managed and that the facilities probably are far from the minimum required for the barest comforts in picture enjoyment.

Basically, the maintenance of sign letters is just the process of keeping them free from dirt, grime, rust, and corrosion —which is to say, keep them clean and always well painted. The suggestions in the following pages all point to this end with many suggestions on how best to do the job and at the same time do it quickly and efficiently. With glass letters steel wool cleans the metallic letter holder, soap and water the glass portion, and ordinary black enamel keeps the metal part looking like new. With metal silhouette letters, the same procedure generally holds, except that a bit of aluminum paint will be required in addition to the enamel.

With the translucent plastic letters, little more than a good scrubbing with soap and water is necessary, as the color is part of the substance of the letters and never has to be renewed.

Where a theatre employs plastic letters made in the manner of the old-type glass letter, the maintenance is similar: the proper painting of the metal part of the frame and a thorough cleaning of the letter part.

In the following pages the story will be told in pictures of the simple measures to be taken in maintaining glass letters and letters of the silhouette type, as well as some suggestions for handling electric light bulbs. To John Mitchell, editor of Lo!, house organ of Loew's, Inc., goes appreciation for permission to reprint from his August, 1946, issue the picture article "How to Brighten Your Marquee," here presented as the discussion of glass letters and that on bulb care. The discussion of silhouette letters, and the two pictures on this page, were made by the staff photographer at the Stanley and Mastbaum Theatres, Philadelphia, in cooperation with the local organization of Warner Theatres.

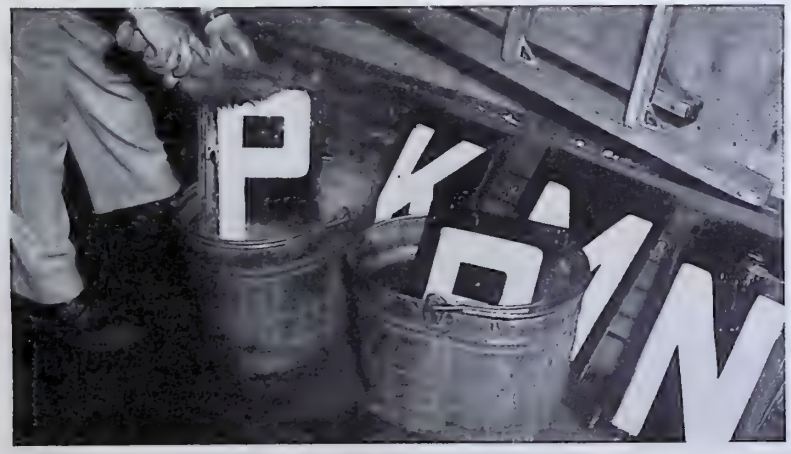
THE MAINTENANCE OF SIGN LETTERS is a small but very important consideration in the management of theatres. Just as the marquee can make or break appearance of a theatre, and can be a success or failure in achieving full value as the theatre's most potent sales argument to the passersby, so can the appearance of the letters themselves add or detract from the effect of their message, be they of glass, as at the Mastbaum Theatre (left), Philadelphia, or the silhouette type, as at the Stanley Theatre (right), also in the City of Brotherly Love. With sign letters, as with all items of equipment, proper maintenance assures the longest life length.

MAINTENANCE OF GLASS LETTERS starts with a cleaning with steel wool. Using this material, rust and grime, which accumulate quickly no matter the location of the theatre, is quickly and effectively removed. Note the glass letter is removed so that a thorough job can be done on the metal part. Painting is the next step.

BEFORE PAINTING THE LETTER FRAME, the glass letter is removed so that not only a better job can be done, but also that no paint is inadvertently smeared on the letter itself. Ordinary black enamel, of a kind that will dry in an hour, is convenient and economical, and can be used, after instruction, by any worker.

AFTER REMOVAL FROM THE STORAGE CLOSET, the dust should be scrubbed from the frames and the glass of the letters before they are placed on the marquee. Two pails of warm water should be used: one for an ample supply of good soap suds, and the other for clear water for rinsing. Letters which are scrupulously clean stay clean a whole lot longer than only half-clean ones. Letters, of course, should be properly washed before being painted.

LETTERS AND FRAMES should be filed or stored away carefully in a closet especially designed for the purpose. Letters should be clean, ready to be used. Here the shelves are slotted to keep the letters upright.



THE MARQUEE TRUCK should be filled in an orderly fashion in order to save time and energy on the outside. Letters here, with some of those still on the marquee are the only ones that are to be needed for putting up the display on the incoming program. To check the life of bulbs, the bags are tagged with the day's date.

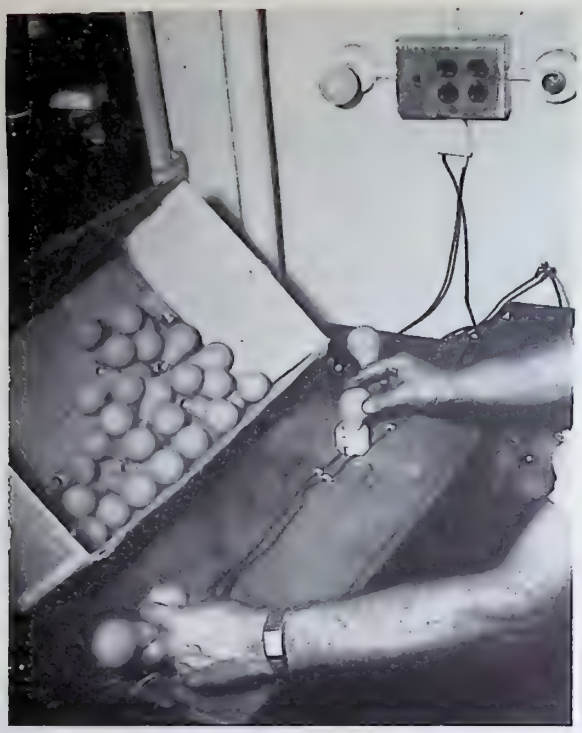
A SLIGHT BIT OF PRESSURE is required to close the gaps between the letter frames on the marquee, but the effort prevents the possibility of stray light spoiling the appearance of the sign made up of partly maintained letters. If bulbs seem short-lived, check with the power company to see that the proper voltage is being used.

MAINTENANCE OF SILHOUETTE LETTER is no less important than that for the older type glass letter previously described. Here the letters are being thoroughly washed to remove the dirt and grime that accumulates where the theatre is or what it is. A stiff-bristled brush can be well employed to facilitate the cleaning.

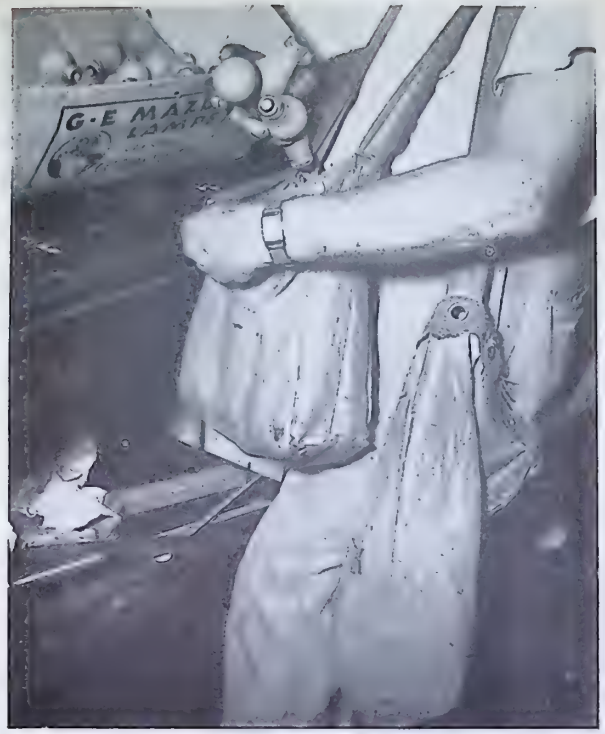
PAINTING THE LETTERS is an easy job, even though two types of paint are required: a black enamel of the usual sort is required for the main surface of the letter, whole aluminum paint is used on the beveled edges of the letters. The letters should be inspected at times for flaws in the paint, and such places repaired.

BEFORE STORING, the letters should be carefully wiped off (above), to remove the inevitable accumulation of dirt and grime that comes after a period of use on the marquee. This cleaning should be followed, quite in addition to the periodic washing. Letters should be stored (below) flat on shelves that are properly braced.

REMOVING THE LETTERS (above) from the storage shelves, they should be carefully gone over to make sure that they are not damaged and that they are all perfectly painted so as to appear well on the marquee. The letters should be arranged efficiently (below) so that when taken to the marquee they are quickly set.

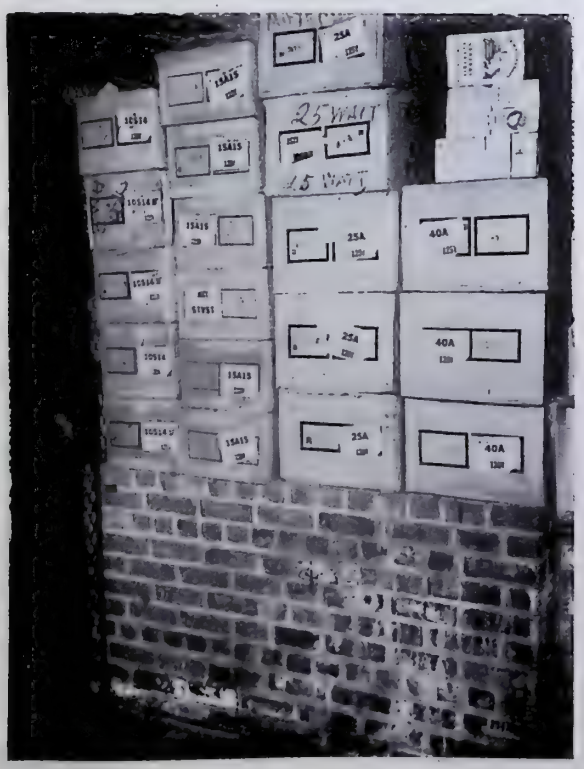


BULBS SHOULD BE TESTED from time to time, not only to eliminate any that may have gone dead, but also to segregate those that have lost an appreciable amount of their light-giving power. The bulbs are quickly tested with this simple electrical board hook-up, enabling the employe to test two at a time, saving time and money.

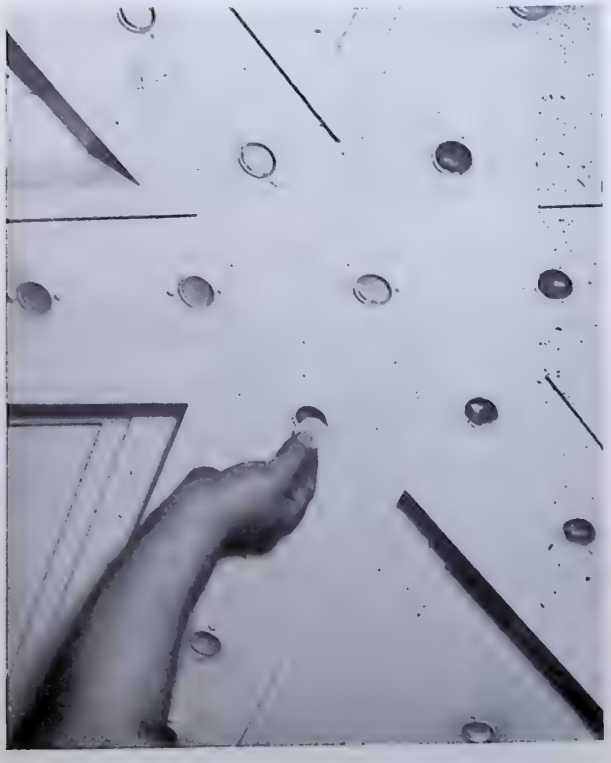


BULBS SHOULD BE CAREFULLY CARRIED, after equally placing them in a convenient canvas shoulder bag for transportation to the marquee or truck. While bulbs are made to withstand a considerable amount of rough handling, they are, nevertheless, fragile things. Carry an empty shoulder bag to keep the dead bulbs.

STORE ELECTRIC LIGHT BULBS, after testing, high and dry, out of the way and above the ground to insure protection from dampness and water. Dampness, besides damaging the cartons and boxes in which the lamps are packed, also promotes corrosion of metal parts of the bulb. Orderliness counts here, as always.



CARDBOARD DISCS inserted in the marquee sockets just before painting the soffit save a considerable amount of trouble, by keeping paint out of where it is not wanted. Paint might ruin the electrical connections or even stop up the socket and make it difficult to insert a bulb. With cardboard, difficulties are avoided.



Design of Box Offices and Display Cases

Suggestions for Design and Construction Adaptable to New and Remodeled Theatres

BEN B. POBLOCKI
Ben B. Poblocki and Sons Company

The theatre owner actually welcomes the theatre-going public who patronize his place of business at the box office just as surely as though he were there in person with a pleasant greeting and a welcoming hand. Yes, the functional operations of the box office are the personal representatives of the theatre owner.

BOX OFFICES

Personal appearance is of utmost importance in the business world, and this is especially true of the theatre box office. No details should be overlooked in the planning of this integral part of the whole physical theatre. The box office must be in harmony with the building front, both in architectural plan and decorative design. If an existing theatre front is to be modernized, for example, eliminating or cutting off corners and installing a round marquee, curved poster cases, and an oval box office will give maximum transformation and create an illusion of a much-wider-than-actual front and streamline the appearance.

It is an established fact that eye-appeal, brought about by way of an attractive theatre front, serves as a magnet and commands the attention of the passing public. Each exhibitor knows that a theatre must take care of its patrons in as efficient and speedy a manner as possible. This means that service at the box office must be readily accessible, personally inviting, and adequately equipped.

Sizes for Box Offices

An average box office should contain a minimum of 150 cubic feet (a 4 x 5-foot booth), accommodating one cashier who can take care of the normal requirements in a town averaging not more than 50,000 people. For large cities, or resorts where traffic is heavy, a box office accommodating two cashiers is recommended. In this case 206 cubic feet is recommended and a 5 x 5½-foot box office is suggested. Where it is desirable to make provision for three cashiers—two in front and one in the rear—270 cubic feet (or a 5 x 6-foot box office) is suggested.

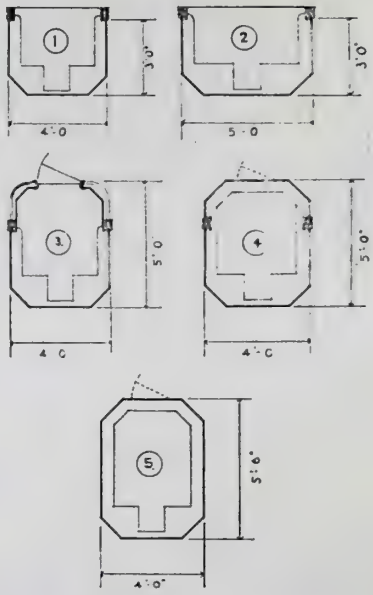
Regardless of the type of box office installed, each cashier should be provided with speak and hand holes, cutout for the change machine, and other items of necessary equipment.

Where winters are severe, a cashier's window with counter should be placed in the rear of the box office for use in inclement weather, thus giving patrons as much consideration as possible. The rear of the box office in that case should be built into the lobby so that it is protected from the elements.

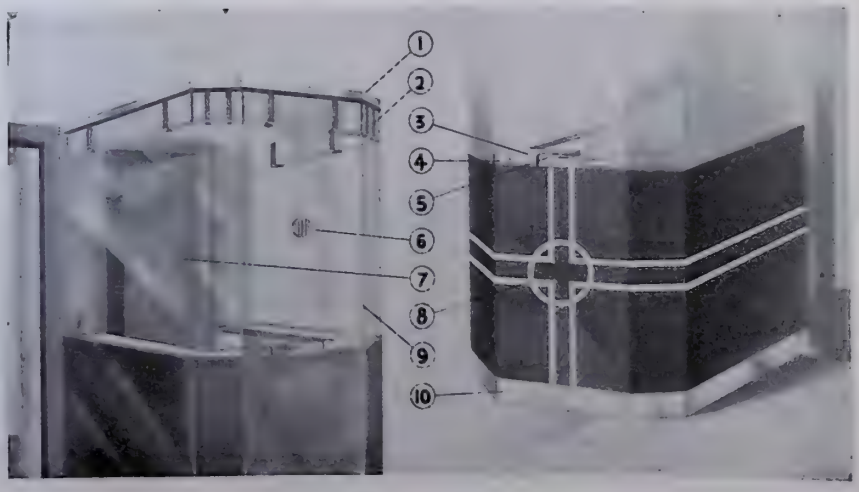
Design and Construction

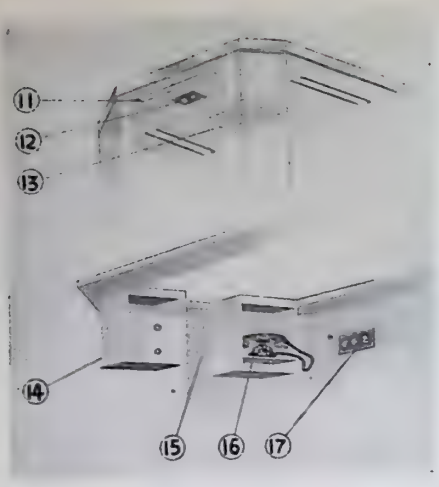
The design of the box office depends entirely upon size and lines of the theatre front. It can be octagonal, oval with curved glass, curved in the front with back flush with the doors, or of the round or oval island-type with no sharp corners. Glass should be installed without corner bars for maximum visibility for both cashier and public. Mitered and cemented glass corners should be used. Either full-height or half doors can be specified since the half doors allow for continuity of line, enhancing the appearance considerably, and the full door shows a break in the lines and provides more convenient access. Doors should be

BOX-OFFICE SPECIFICATIONS (right)—(1) Overall height 7 feet, 6 inches. Includes complete front unit. Rear door and back easily installed by purchaser in accordance with drawings. Contains all equipment and conveniences of standard box offices. Shipped knocked down, with complete instructions for erection. (2) Same as No. 1, but with additional width on front. (3) Complete with rear door and interior partition of enameled plywood, equipment, and conveniences, according to standard specifications, are given. (4) Complete box office, with glass on all sides. Two real plates, speak hole, and so forth, for selling tickets inside the lobby. Complete according to the standard specifications. Provision made for door parts. (5) Deluxe island type. 7 feet, 6 inches high. Polished plate glass and porcelain enamel all sides. Two deal plates if desired. Complete with all equipment according to standard specifications. All exterior trim is of stainless steel, and the deal plate is covered with stainless steel. Special combinations can be ordered



CONSTRUCTION DETAILS of box offices as discussed in this article are set for in this drawing. (1) Top border of stainless steel or architectural porcelain. (2) Venetian blinds. (3) Stainless steel deal plate. (4) Change-making opening. (5) Hand opening. (6) No-draft speaking tube. (7) Flush birch door. (8) Architectural Excel porcelain enamel facing. (9) Mitered, polished plate steel. (10) Stainless steel recessed base, with toe space. Inviting is the word for these box offices. Clean lines fashioned of beautiful materials enhance the appearance of the box, and truly invite patrons to step up and purchase a ticket for good entertainment. There is no shabby exterior, no dingy lighting instinctively to make the customers decide to go somewhere else. Clean, shining glass above colorful design in porcelain, subconsciously assure them that inside of the theatre is as comfortable as the exterior is attractive. Designed to last, as well as to attract, box offices utilize the finest available construction principles and provide years of service with a minimum of upkeep. The framework consists of 2-by-4 studs and is covered with ⅜-inch plywood paneling. The exterior is faced on all sides with insulated porcelain enamel, of a color or colors and design selected by the purchaser. The interior is completely finished with ¼-inch plywood. Between the outer and inner plywood paneling, as well as in the ceiling and floor, is rockwool. Theatre builders should pay much attention to box offices, to provide the finest possible working conditions for cashiers.





MORE CONSTRUCTION DETAILS of the box offices discussed in this article are here set forth. (11) Flush cold cathode lighting. (12) Convenient electrical outlets. (13) White-enameled louvered ventilation grille. (14) Money and report drawers and compartment. (15) Enameled plywood interior. (16) Telephone compartment and report shelf. (17) Convenient electrical outlets. The rockwool insulation is of sufficient thickness to insure comfort during any extreme temperature. A sub-floor is of ¾-inch plywood, and is raised approximately 5 inches off the walk grade to allow for adequate insulation. It is covered with a top grade of carpeting. The glass used around the entire box office is ¼-inch polished plate glass, with patented mitered corners. No vertical corner bars are used. The front plate glass is equipped with a speak hole, hand hole, and cut-out for change-making. All edges are polished and each plate is permanently set in neat stainless steel mountings at both top and bottom. All exterior trim is of stainless steel, and the deal plate is covered with stainless steel. The rear door is either panel-type or flush birch veneer, and is installed with necessary hardware, including a Venti-louver panel for ventilation which is mechanically controlled and operated from inside the box office. A second such panel is also incorporated in the ceiling. Glass can be installed in the rear door. These box offices promote the efficiency of the cashiering personnel in providing the working conditions that are the best the theatre can provide.

furnished with complete, modern hardware, including reliable locks. Base of box office should be provided with convenient recessed toe space.

Porcelain panels in various colors, which can be combined with stainless steel formed in design, or just the gleaming fluted stainless steel itself, are versatile materials, well suited for the exterior of a box office on all sides up to the counter. The interior, finished with plywood, should be insulated to a thickness sufficient to insure comfort during any extreme temperatures.

Equipment

Ventilation panels, operated inside the box office, should be incorporated into the door and ceiling.

Box offices should be installed complete with following fixtures and conveniences: Electric fan stand; money drawer; shelf for reports; shelf for money wrappers; conduit to house phone and outside phone connection; outlet for ticket machine and electrical outlet for general use; built-in heater; concealed device for dropping accumulated money out of sight; venetian blinds.

Lighting

Lighting is an important feature, and the best illumination must be provided with a minimum in maintenance cost. Lighting engineers agree that cold-cathode lighting recessed in the ceiling of the box office solves both of the above problems. Cold-cathode has longer life than the hot-cathode type and it provides no-glare illumination inasmuch as it is a soft light with a low-surface brilliance and, therefore, can be used direct without any glass diffusers or louvers if so desired. Cleaning the tubes is a simple matter, for it is necessary merely to wipe off the top part of the lamp by turning the tube over a half turn. Cold-cathode also blends in with the light under the marquee area, for which theatre architects and engineers frequently specify recessed 150-watt PAR lamps to furnish adequate light. Such lamps are economical, while replacement costs are high when 25-watt bulbs are used.

It would be well worthwhile for the exhibitor to make a check list on the points mentioned and take stock of the present facilities of his box office to see that no detail has been slighted or overlooked. Is it doing the personal, efficient job it should be doing, and if not, why?

POSTER CASES

Confucius once said that one picture was worth ten thousand words. In the modern theatre, attractive, gleaming, stainless-steel poster cases have as their prime function the showing off and calling attention to that one picture!

Materials

With so many modern materials on the market today, architects and exhibitors demand the best in contour, construction, and design. Poster cases are now available to meet such demands, constructed of durable, attractive materials (such as polished stainless steel), completely wired, illuminated, ready to install, with water-tight, dust-proof doors to eliminate all chance of poster spoilage—and able to stand up under continual usage and extreme temperatures.

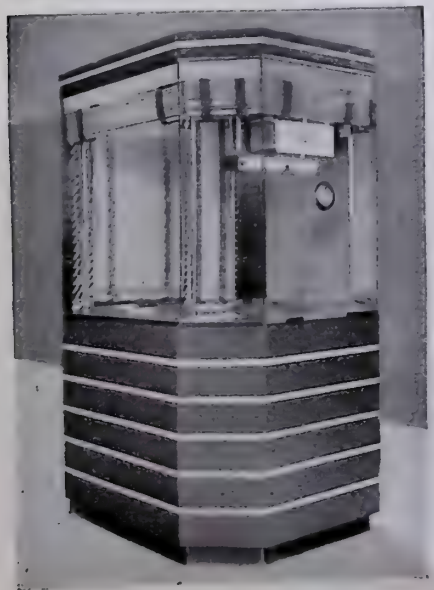
Lighting

Good lighting is essential to the advertising efficiency of the poster case. Today such cases are available with lighting around the entire frame, thus eliminating all shadows.

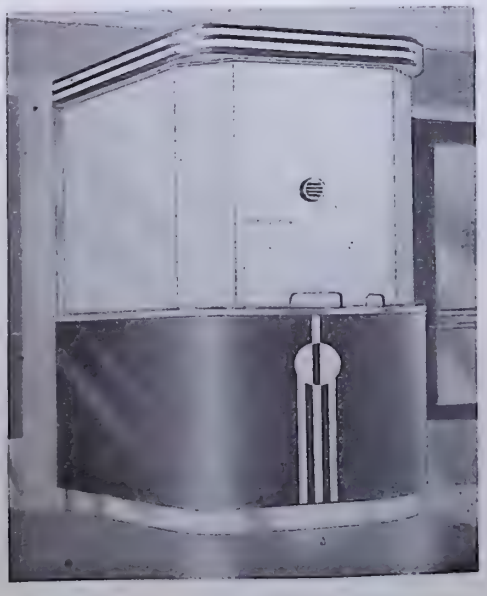
Sizes

In carrying out a progressive idea of display for visual selling, it is suggested that architects specify one single size poster case throughout the theatre, such as the 40 x 65-inch glass size. Most exhibitors throughout the country prefer this size, as it accommodates all sizes of posters up to and including the standard 40 x 60 poster, plus a 5-inch date strip at the top or bottom. To recess such a 40 x 65-inch glass-size case, the recess in the wall must be 3⅝ inches plus ¼-inch play all around.

To obtain over-all dimensions on these cases: add 8¼ inches to width of glass size and 12½ inches to length of glass size on surface and recess type cases, illuminated; on non-illuminated recess, add 5½ inches to height and 5½ inches to width and on non-illuminated surface, add 4½ inches to height and 4½ inches



TWO DESIGNS of box offices, such as are described in this article, as pictured here. The box offices are completely insulated, and adequate provisions are made for ventilation. In many of the models, glass can be installed in the rear door of the box office, with speak hole, hand hole, and counter, for sale of tickets in extremely cold or very inclement weather. Each box office is completely fitted with the following accessories and equipment: electric fan stand, money drawer, shelf for reports, shelf for money wrappers, conduit for house telephone, outside telephone connection, outlet for ticket machine, electrical outlet for general use, and, if desired, a fan-type, 1,200-watt electric heater. Lighting is an important feature, and the best illumination must be provided with a minimum in maintenance cost. Lighting engineers agree that cold-cathode lighting recessed in the ceiling of the box office solves both of these problems. Cold-cathode has longer life than the hot-cathode type and it provides no-glare illumination inasmuch as it is a soft light with a low surface brilliance and, therefore, can be used direct without any glass diffusers or louvers is desired. The equipment of the box office, as set forth, is quite complete, and offers the cashier all the conveniences and aids that are necessary for the rapid and efficient consummation of her important and frequently invaluable services to theatre's management.



THE WHOLE FRONT of a theatre should be considered in a face-lifting program, with consideration being given to porcelain enamel fronts, available in a wide range of colors and styles, or life-time construction and quality; to marquees, with name signs, attraction boards, and complete fonts of changeable cast aluminum letters; to lighting fixtures, employing cold-cathode tubing, brilliantly lighting theatres, both inside and outside; to poster cases, featuring wide area display and visibility, plus convenient, secure construction details; and to box offices that are modern, streamlined, and fully equipped for fast and efficient ticket selling.

to width.

Specifying one size as standard throughout the theatre means that valuable display area within the foyer can be utilized by the purchase of an easel type case to display coming attractions. After a certain period of time has elapsed, the poster can be transferred from the easel case to lobby wall case, and finally to outside recessed case when the show is current.

Building lines of the theatre front will determine the type case to be installed—recess or surface, regular flat or corner type, or new round poster cases curved-to-any-radius. These last harmonize with the rest of the design of modern architects, designers who are moving away from extensive flat surfaces and are including sweeping curves in theatres being built today.

THE DISPLAY FRAME, as shown in these two photographs, reveal two important advertising services. Specifying one size as standard throughout the theatre means that valuable display area within the foyer can be utilized by the purchase of an easel-type case to display coming attractions. After a certain period of time has elapsed, the poster can be transferred from the easel case to outside recessed case when the show is current. The corner case utilizes 1-inch diameter, round-the-case lighting, stainless steel construction, water-tight doors, each case a complete unit, with the stock model having a glass size of 40 by 65 inches (for 40x60 posters).

How to Keep Rubber Mats Looking Like New

Some Suggestions on Proper Maintenance To Ensure Long Life, Extended Service

DO WASH MATS CAREFULLY with Ivory flakes and water, using small quantities of the flakes to a 5-gallon pail of water. Use a slightly moist mop, washing the mats in the direction of the corrugations. Careful washing keeps the valuable rubber matting not only looking like new, but adds much to the length of its life.

Statistically-minded attaches of Loew's Inc., have calculated that, if its rubber matting would be placed side to side, a mile-long highway could be surfaced. To protect this investment, and to ensure long life, the company's purchasing agent, Max Wolff, has set forth a number of valuable suggestions.

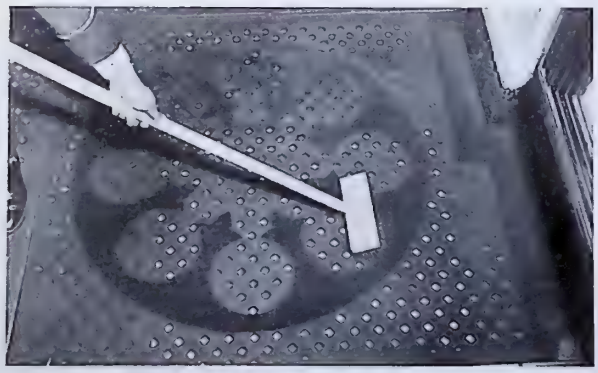
Permission to use this material, words and pictures, has been granted by John Mitchell, editor of Lo!, the company's house organ.

Whether an exhibitor's pride and joy be a far-flung empire, like that of Loew's, Inc., or just a little house serving but a tiny segment of the population, the principles of good management always take into consideration the preservation of the present equipment.

Where lobbies and foyers are rubber matted, it is this material that is subject to the hardest wear, the most brutal punishment of any item in the theatre. Never really cheap, even in times of unlimited supplies, it behooves all theatremen carefully to preserve their rubber matting to the best of their ability—and that of the attaches who actually do the work.

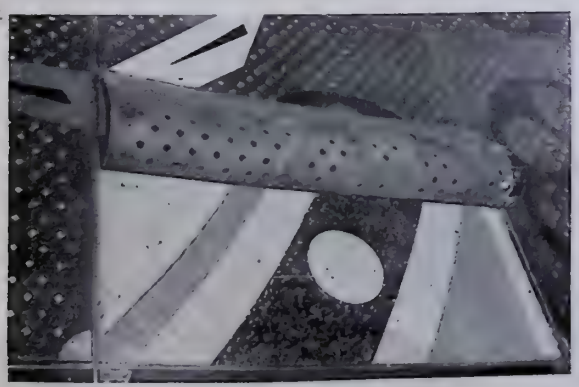
In the ten photographs and cartoons in these pages will be found five suggestions which should be followed by everyone, and five warnings of things that no one should do.

DO CLEAN OUT THOROUGHLY the corners of the recesses, so that dirt will not push the corners of the mats up above the surface of the floor, where they can curl and become a real hazard to passing patrons. By giving thoughtful consideration to the care of rubber matting, one of the too many accident hazards can be eliminated.

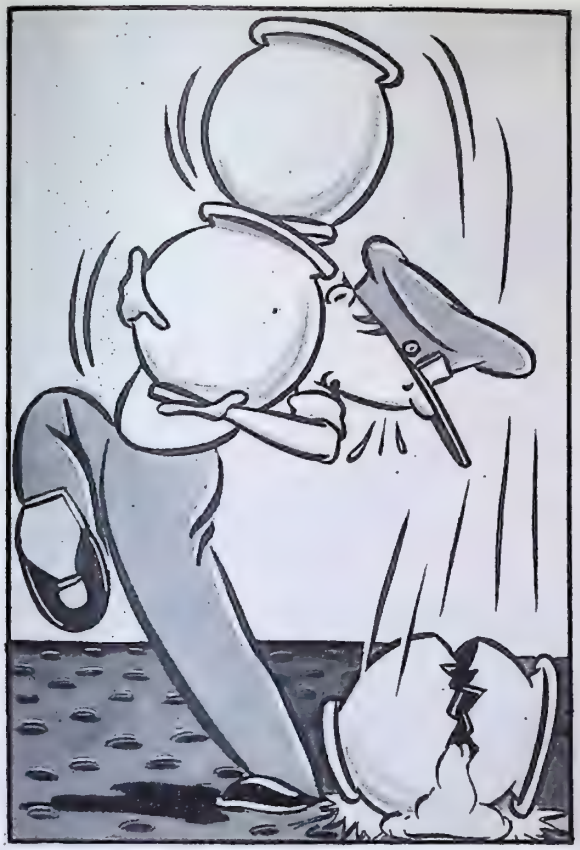


DO SCRUB LIGHTLY with a brush severely soiled mats, and be sure to scrub in the same direction as the corrugations. Never employ strong cleaning solutions, which bleach the mats and disintegrate the rubber, thus obliging early replacements of this valuable theatre asset. Besides, use of strong solutions is not necessary.

DO ROLL LARGE MATS carefully away from the recesses, thoroughly clean under them, and then roll back and repeat process. In this way, any section, however large, can be thoroughly and easily cleaned without it being necessary completely to uncover the whole area. Always roll the mats half way, then roll them back.



DO STACK MATS always in a flat position. At certain seasons of the year, when storage becomes necessary, put them away flat. If the theatre's mats are too large for easy stacking, roll each mat on a core, with the corrugations outward. After mat has been carefully rolled, store it away, making sure to store it on edge.



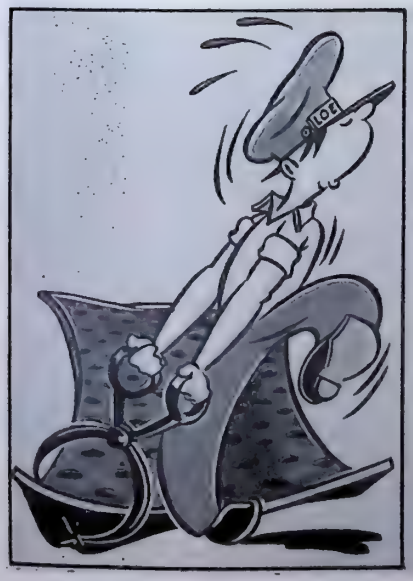
DON'T DROP HEAVY OBJECTS on rubber mats—they cause cuts and have a tendency to make tears between the mat's perforations. Despite the fact that rubber matting is designed to stand long hard wear—the normal kind from the heaviest of traffic — it is not planned as a buffer to any and all kinds of accidents.

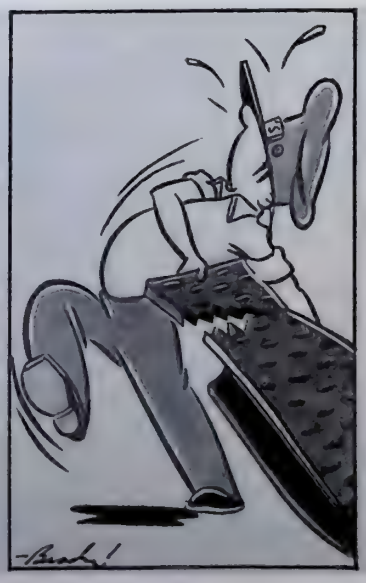
DON'T GET WATER in the recesses of the mats, as the sulphur in the mat combines with the oxygen of the air in the presence of water to form a sulphuric-acid condition. Remember, as stated earlier, always use the mop but slightly wet, and be sure to clean up immediately all excess water that may be inadvertently spilled.

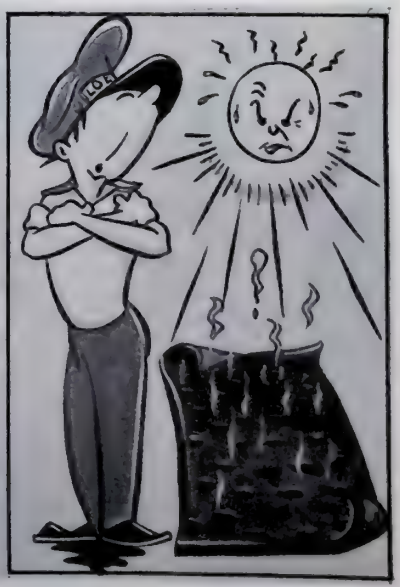
DON'T USE HOOKS to lift mats, as mats are easily torn and twisted through mishandling. For long life, a theatre's rubber mat should be handled with care—use no hooks!—and all possible consideration given it.

DON'T DRAG BIG MATS when cleaning, as they will be weakened and, through the weakening, become curled up and present a traffic hazard to the theatre patrons. Possible tearing of mats is also prevented.

DON'T EXPOSE colored mats for long periods of time to direct sunlight. To do this will cause the colors in the matting to fade, even though the colors are sufficiently color-fast under normal theatre lighting.







WAGNER SIGN SERVICE, INC.

Presents

THE LARGEST LINE *of Quality* MARQUEE DISPLAY EQUIPMENT *in the World*

Designed for powerful attention value and effective selling

Your front and marquee are worth a lot of money to you if used properly. Cash in on them!

Focus interest upon your theatre . . . compel attention to your offering . . . outsell your competition . . . build your grosses by billing every attraction as a big event.

If you want to put these forces to work for you and don't know how or where to begin, we will be glad to extend to you our complete planning service. Forward a photograph or rough layout of your front, and marquee, if you have one, and we will offer our recommendations.

GIANT WINDOW-TYPE FRAMES
MASTER MULTIPLE MOUNTING FRAMES
COLORED TRANSLUCENT PLASTIC LETTERS
ALUMINUM SILHOUETTE COVE LETTERS
LOBBY DISPLAY UNITS
COLORED PHOTOGRAPHIC TRANSPARENCIES
LETTER MOUNTING STRIPS
FLEX-WORD UNITS
DISPLAY FRAME GLASS

FREE catalog on all Wagner products sent on request

Wagner Sign Service, Inc.
218 S. Hoyne Avenue
CHICAGO 12, ILL.

Name and address of your nearest Wagner theatre supply dealer or sign shop sent on request

WAGNER STAINLESS STEEL FRAME AND GLASS UNITS

"39"

In the "39" type 3-in-1 Unit the frame inserts in a channel at top and bottom. It has no drain flange.

"41"

In the "41" type 3-in-1 Unit the frame inserts in a ¾" wide by 1½" deep channel at top and has a drain flange which sets over rail at bottom.

'39 and '41 MODELS RECOMMENDED FOR OPENINGS UP TO, AND INCLUDING 43"

WAGNER WINDOW-TYPE FRAME AND GLASS UNITS

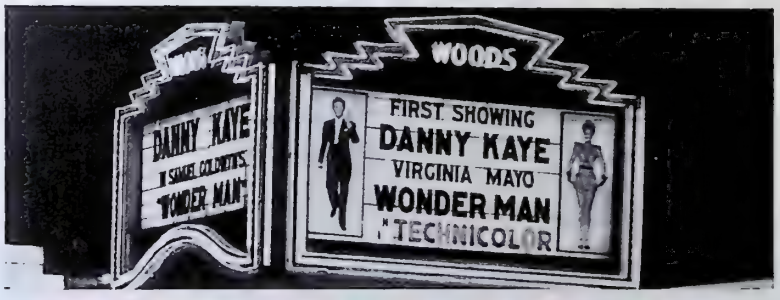
(PATENT PENDING)

The only marquee frame which affords billing space of any height or length. Accommodates the smallest to the largest letters and lifesize photo transparencies.

Installed separately and before the glass. Lamps, neon and glass removed, cleaned and replaced without removing frames. No shopwork necessary in the event of glass breakage.

All parts of the sign may be serviced through open windows. Lamps are replaced as easily as though they were exposed.

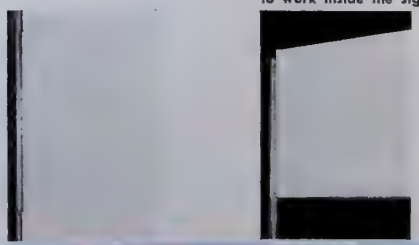
These frames within two years will accordingly pay for themselves by elimination of maintenance costs necessary with any other large multiple type frame of four rows of ten-inch letters or over.



HERE'S HOW IT WORKS!

1. The maintenance man raises a window to gain access to the inside of the sign.

2. The window is held open by a small hook. Both hands are free to work inside the sign.



3. This is a rear view of one window panel. All panels, except the top one, slide in narrow guide channels, placed at such an angle that each glass slides behind the one above. The glass may be removed by simply raising the panel above the top of the channels.

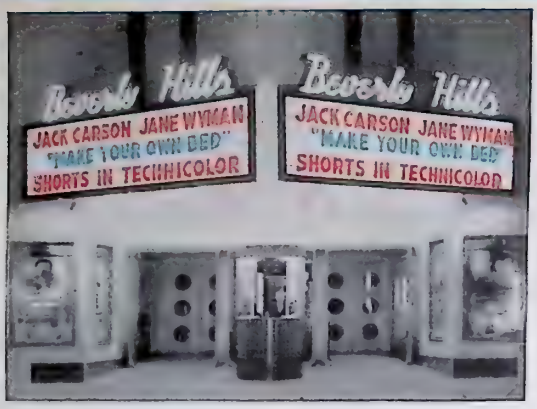
4. This is a rear view of the top panel. Note the short channels at top and bottom. By simply raising this panel above the bottom channel and bringing it down inside the sign the glass may be removed.

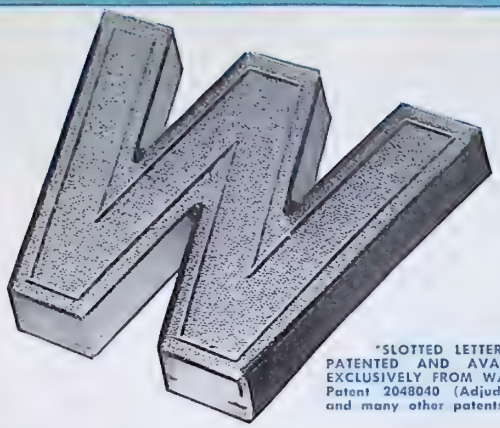
Wagner Sign Service, Inc.

218 S. Hoyne Avenue

CHICAGO [illegible]

WAGNER SLOTTED TRANSLUCENT COLORED PLASTIC CHANGEABLE LETTERS*





*SLOTTED LETTERS ARE PATENTED AND AVAILABLE EXCLUSIVELY FROM WAGNER Patent 2048040 (Adjudicated) and many other patents.

The modern means of attracting business. Afford a vivid, colorful display—impossible with other letters. Gorgeously brilliant when light shines through them, they assume sharply silhouetted third dimensional effect by day. Available in 4", 10" and 17" sizes in red, green, blue, amber and opaque black. The colors go all the way through, cannot fade, chip or scale. Never require painting. Strong. Durable.

GOOD SHOWMANSHIP DICTATES THE USE OF WAGNER COLORED PLASTIC LETTERS

WAGNER LOBBY DISPLAY UNITS

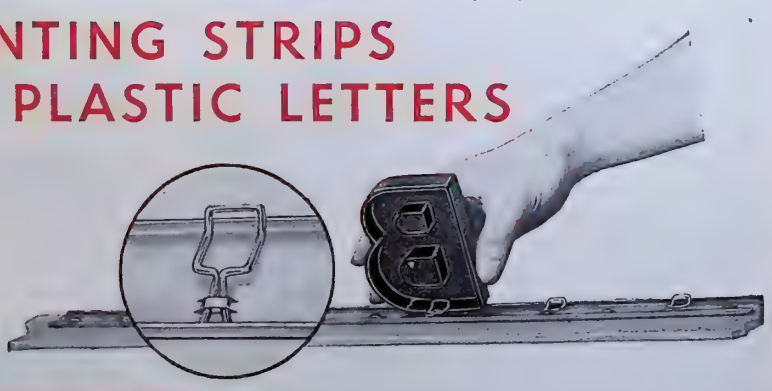
An effective medium for selling coming attractions. Constructed of sheet steel, with attractive, white enamel finish. Easy to install. 24", 36" and 48" sections combine to make any length. Each unit is 7" high, with two sockets per lineal foot.

Wagner Slotted Plastic Letters are mounted on the bars in the middle, or firmly held in "standee" position at the top, or suspended from the bottom by clips.

WAGNER MOUNTING STRIPS FOR COLORED PLASTIC LETTERS

White enameled sheet steel, drilled for easy mounting above or below any cove or other wood foundation, where no other display equipment could possibly be used.

NO SPECIAL WIRING NECESSARY



Wagner Sign Service, Inc.
218 S. Hoyne Avenue
CHICAGO 12, ILL.

WAGNER TRANSPARENCIES AND TRANSPARENCY FRAMES

Designed to inject the compelling power of colored photographic realism in marquee displays on current showings and to advantageously exploit coming attractions in lobbies.

These brilliant, full-colored transparencies can be made on all stars and in any size up to life-size and larger to fit Wagner Transparency Frames, which in turn fit any Wagner Master Multiple Frame, the same as letters.

Shadow boxes are available to fit any transparency frame or may be made by your sign man. Specifications will be furnished on request and without obligation.

Wagner Transparency Frames are available in size 21¾" x 25¾" to accommodate 21" x 25" transparencies and in size 30¾ x 40¾" to accommodate 30" x 40" transparencies. Larger sizes on special order.

WAGNER SLOTTED ALUMINUM LETTERS

for use where especially large letters are desirable and in combination with translucent colored plastic letters.

A variety of types and colors in 8 sizes: 30", 24", 16", 12", 10", 8", 6" and 4" letters, slotted with uniform spacing. This is an exclusive patented Wagner feature.

WAGNER FLEX-WORD UNITS

These miniature frames mount on standard Wagner frames of 7-inch bar spacing and provide for the easy forming of units of less important words with 4-inch letters. They permit better use of space and make word-plates unnecessary. Available in horizontal lengths of 8, 12, 16, 20 and 24 inches.

Wagner Sign Service, Inc.
218 S. Hoyne Avenue
CHICAGO 12, ILL.

ADLER --

SIZES : 4" · 6" · 8" · 10" · 12" · 16" · 24"

No Other Way to Obtain So Many Big Features!

"THIRD DIMENSION" LETTERS in 4" - 6" - 8" - 10" - 12" - 16" - 24" sizes, for interchangeable use of all sizes, from 8" to 24".

"REMOVA-PANEL" EQUIPMENT—time-tried, exclusive—money-saving. Never necessary to remove any frame for maintenance.

REGULAR TYPE FRAMES where every other unit is made removable for maintenance.

MULTI-DECKER FRAMES FOR INTERCHANGEABLE USE OF 8" - 10" - 12" - 16" - 24" "THIRD DIMENSION" LETTERS.

LOCKED-IN-LINE FRAMES Stainless Steel—strong, rigid, sky-scraper-like construction—light-tight joints.

GLASS-IN-FRAME CONSTRUCTION—we furnish the glass and glaze frames complete before shipment.

FRAMES SET DIRECTLY IN GROOVES OF SIGN—no changes required—no clips to scratch the surface.

POPULAR 10" - 16" - 24" COMBINATION—letters line up perfectly—use larger letters as Capitals or for STARS and TITLES.

TOUGH, BAKED FINISH—for long, satisfactory service.

ATTRACTIVE COLORS—standard finish, black face and silver bevels. Red, blue, green, amber or other colors furnished.

7/8" WIDE GROOVE CONSTRUCTION—recommended, but we also furnish frames to fit existing grooves as narrow as 1/4" wide.

CURVED MARQUEE OR MITRED FRAMES—furnished.

WONDERFUL FOR REPLACING OLD STYLE LETTERS. We furnish frames to fit any existing grooves, down to 1/4" wide.

APPROVED BY UNDERWRITERS' LABORATORIES, INC.

LETTERS GUARANTEED—for every Adler letter you break, we give you a new one FREE.

WRITE FOR COMPLETE INFORMATION—No obligation.

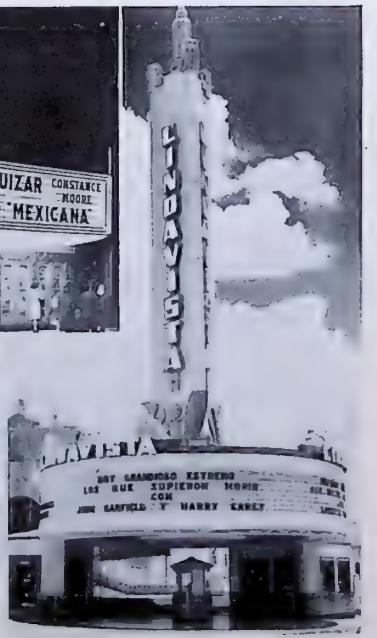
ADLER FOR MODERN ALL SIZES
"3RD DIMENSION" DISPLAY 8" TO 24" INTER-
LETTERS CHANGEABLE

Above, Valley Drive-In Theatre, Harlingen, Texas, with modern Adler Changeable Program Display. Adler equipment is perfectly adapted for Drive-In Theatres, to signs of any shape or size.

Weis Theatre, Savannah, Ga., showing 10" and 16" "Third Dimension" Letters used interchangeably on Adler "Remova-Panel" Glass-in-Frame Units.

View from inside of lobby toward street, of RKO Grand Theatre, Chicago, a new installation showing the use of ADLER 8" and 10" "Third Dimension" Letters on "Remova-Panel" frames, to announce coming features.

Above, College Theatre, Brookings, S. D., an example of modern small theatre design with Adler "Third Dimension" Letters and Glass-in-Frame Units in sign.



All-curved marquee of the Lindavista Theatre in Mexico City showing modern Adler "Third Dimension" Letters and Curved Frame and Glass Equipment.

"THIRD DIMENSION" LETTERS

Exclusive STAINLESS STEEL "REMOVA-PANEL" *Glass-in-Frame* EQUIPMENT

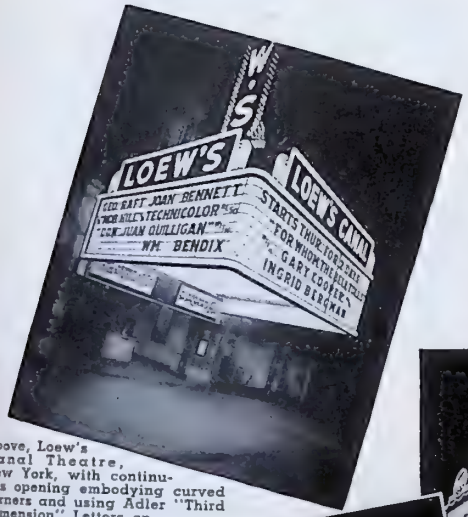
For Interchangeable Use of All Sizes—8" to 24" on Locked-in-Line, Multi-Decker Frames

Take advantage of modern, brilliant, outstanding Adler marquee program display that successfully tells and sells the world its theatre entertainment. Fits right into the spirit of today's post-war architectural designs for new theatres—provides striking modernization effects on existing marquees. In use all over this country and abroad.

OUTSTANDING "REMOVA-PANEL" FEATURE

Over 6 Years of Perfect Success

FOR FLUORESCENT TUBING OR ORDINARY LAMPS
SAVES ITS COST FAST IN SIGN MAINTENANCE



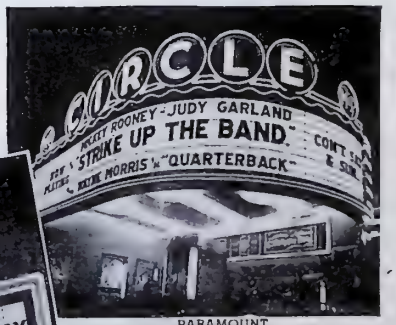
Above, Loew's Canal Theatre, New York, with continuous opening embodying curved corners and using Adler "Third Dimension" Letters on "Remova-Panel" Glass-in-Frame Units.

How "Remova-Panel" Saves Time and Labor

Simply swing out or remove entirely the small lightweight "REMOVA-PANEL", approximately 7" x27", instead of lifting out a large, heavy glass-in-frame unit. For Fluorescent Tubing, you can reach in and put a jumper across if a tube burns out and thus keep the sign operating. "REMOVA-PANEL" units alternate with Regular Type units in the opening, as furnished. Every panel between all horizontal bars in standard "REMOVA-PANEL" units, is a removable panel.

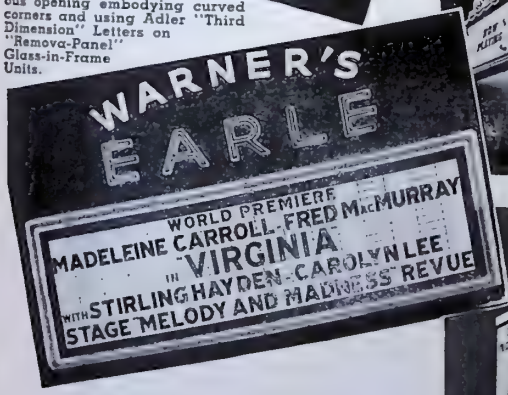
Fluorescent Tubing being lifted out through "REMOVA-PANEL."

Ordinary lamps easily accessible through "REMOVA-PANEL."



PARAMOUNT
(See caption at right bottom.)

A Fox Theatre installation of 10" and 16" Adler Letters used interchangeably on Adler Frame and Glass Equipment.



Warner Brothers' Earle Theatre, Washington, D. C.—Silhouette Changeable Letter space 32 feet long by 9 feet high (7½ lines) mounted across the face of the building. **The "REMOVA-PANEL" feature was the only thing that made this large display possible. In successful use since Jan., 1941.**

RKO "Grand" in Chicago's Loop, showing new and modern marquee just completed, with program display of 10" and 16" "Third Dimension" Letters on "Remova-Panel" Glass-in-Frame units. Sign over doors and in Lobby are also Adler Displays.

Centre picture, Circle Theatre, Brighton, Mass. A Paramount curved marquee with 10" and 16" Adler "Third Dimension" Letters used interchangeably, on *Locked-in-Line* Glass-in-Frame Units.

UNITED STATES PATENTS		Canadian Patents
No. 1,830,414	No. 2,163,298	No. 369,858
No. 1,989,855	No. 2,272,733	No. 411,691
No. 2,038,978	No. 2,284,626	No. 421,193
No. 2,113,285	No. 2,313,723	
No. 2,144,954	No. 2,313,724	
No. 2,155,904	No. 2,319,910	England Patent
No. 2,156,257		No. 442,512

And other Patents Pending

LISTED BY UNDERWRITERS' LABORATORIES, INC.

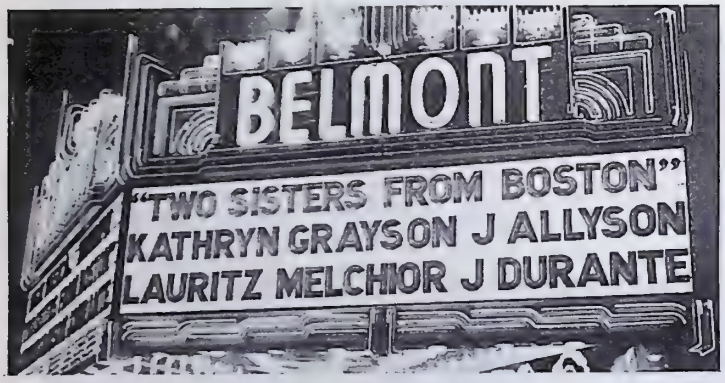
ADLER SILHOUETTE LETTER CO.

General Offices: 3021 WEST 36th STREET, CHICAGO 32, ILLINOIS
CHICAGO — NEW YORK — TORONTO, CANADA — LONDON, ENGLAND

PUT GREATER *ATTRACTION* *with* BEVELITE

REMARKABLE THIRD DIMENSIONAL EFFECT

BEVELITE designers have created a translucent plastic letter which produces an amazing third dimensional effect not found in any other marquee letter. No illustration can do it justice. It must be seen to be appreciated.



This remarkable third dimensional effect found only in BEVELITE translucent marquee letters in plastic.

SHARPER VISIBILITY AT GREATER DISTANCES

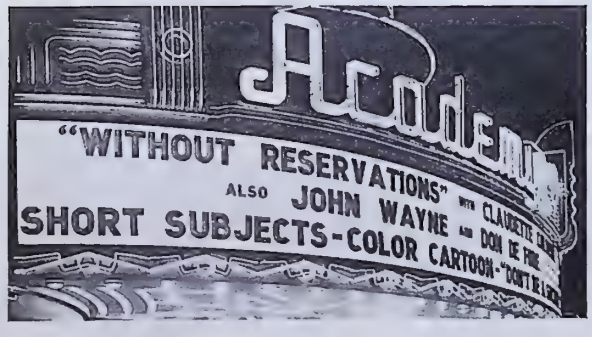
With BEVELITE your marquee billing stands out sharper and clearer at greater distances day and night . . . is seen by more people . . . builds bigger box office!

NEW PLEXIGLASS BACKGROUND PANELS

The new BEVELITE Plexiglass panels provide a clear, white, translucent field. These sliding "showcase" type panels allow lighting to be serviced with the same ease as changing a letter.

BEVELITE Plexiglass background panels are manufactured of the new war-tested Plexiglass and (1) Will not fade, (2) Will not warp, (3) Have successfully withstood extreme changes in temperature ranging from 70° F. below zero to 187° F. above, (4) Light transmission better than glass, (5) Color uniform throughout, and (6) Unbreakable.

Standard, translucent, white glass panels are also available if desired.



NO UNSIGHTLY METAL TRACKS!

BEVELITE Plexiglass or glass panels are supported by clear, extruded plastic tracks which make it possible to "float" the letters on a sea of light with no unsightly metal tracks visible to mar the background.

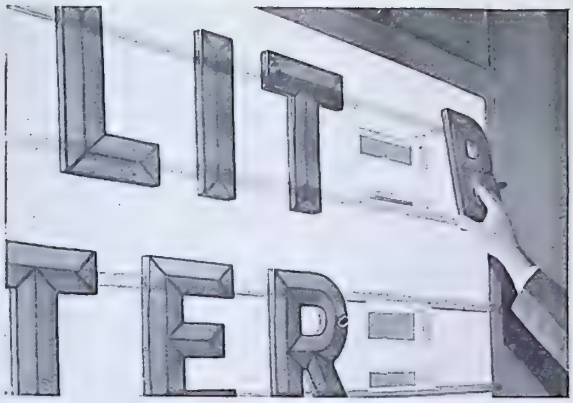
Distributed by

NATIONAL THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.

A UNIT OF NATIONAL STANDARD THEATRE EQUIPMENT

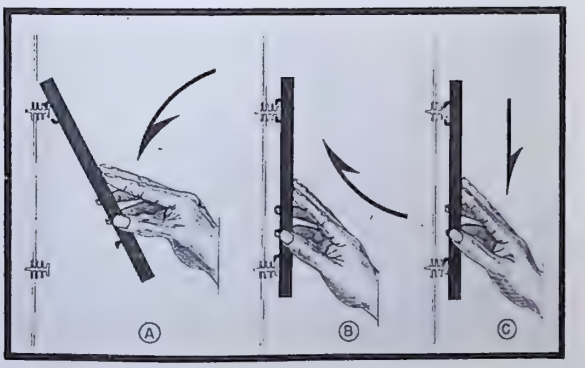
POWER INTO YOUR MARQUEE

Marquee Letters in Plastic!



BEVELITE LETTERS EASY TO CHANGE!

Closeup of marquee showing sliding BEVELITE Plexiglass (or glass) panels in open position, clear extruded plastic tracks and vertical metal support brackets.



NEW LOCK-LUG CONSTRUCTION

As the name implies, the new Lock-Lug construction makes it possible to actually "lock" each letter into position on the marquee.

Illustration "A" shows the manner in which the letter is easily hooked into the top track, "B" is swung into position, and "C" is securely locked into both tracks. When locked in place, BEVELITE letters are so securely affixed to the marquee, that they will remain firmly in position and cannot be dislodged by heavy wind, rain, or snow.

NEW RADIANT COLORS!

BEVELITE letters are manufactured from new Butyrate Thermo-Plastic material which is fully translucent. They are color-fast, the color goes all the way through the letters and cannot chip or scale off. These letters are available in three new radiant colors—red, green and blue—in both 10" and 17" sizes. Other colors and sizes soon.

BEVELITE LETTERS ARE EASILY INSTALLED!

Complete BEVELITE installations may be easily made by any sign company from blueprints and instructions supplied by the manufacturer. In spite of the radical change they will make in the marquee, no heavy construction changes are required.

Manufactured by
THEATRE SPECIALTIES, Inc.
1963 S. Vermont Avenue, Los Angeles 7, Calif.

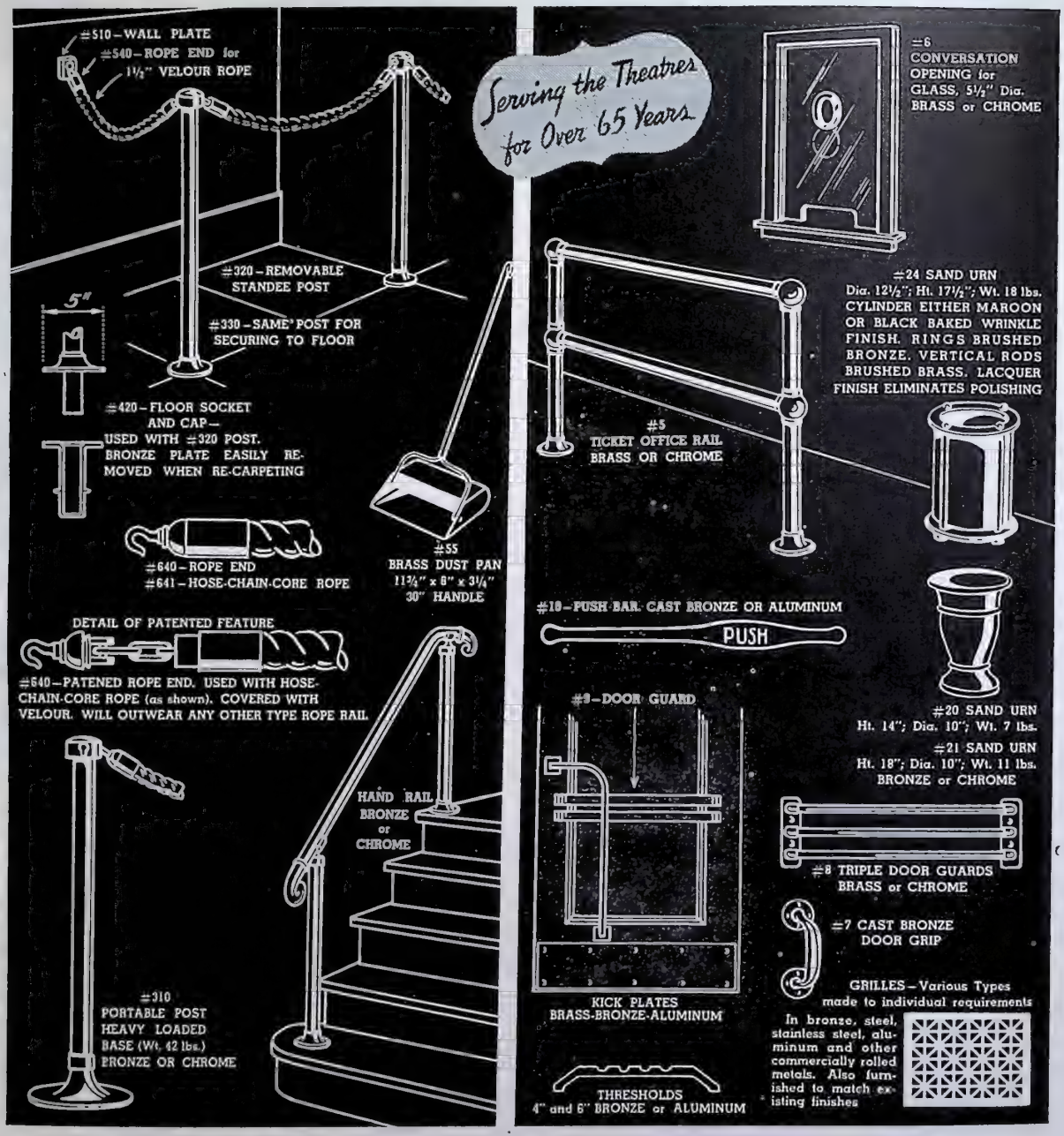
Distributed by

A UNIT OF NATIONAL STANDARD THEATRE EQUIPMENT

NATIONAL
THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.

• THE NEW *Post-War* MODELS •

THEATRE LOBBY EQUIPMENT


#510—WALL PLATE
#540—ROPE END for 1½" VELOUR ROPE
Serving the Theatres for Over 65 Years
#6 CONVERSATION OPENING for GLASS, 5½" Dia. BRASS or CHROME
#320—REMOVABLE STANDEE POST
5"
#330—SAME POST FOR SECURING TO FLOOR
#24 SAND URN
Dia. 12½"; Ht. 17½"; Wt. 18 lbs. CYLINDER EITHER MAROON OR BLACK BAKED WRINKLE FINISH. RINGS BRUSHED BRONZE. VERTICAL RODS BRUSHED BRASS. LACQUER FINISH ELIMINATES POLISHING
#420—FLOOR SOCKET AND CAP—USED WITH #320 POST. BRONZE PLATE EASILY REMOVED WHEN RE-CARPETING
#5 TICKET OFFICE RAIL BRASS OR CHROME
#640—ROPE END
#641—HOSE-CHAIN-CORE ROPE
#55 BRASS DUST PAN 11¾" x 8" x 3¼" 30" HANDLE
#10—PUSH BAR. CAST BRONZE OR ALUMINUM
PUSH
DETAIL OF PATENTED FEATURE
#640—PATENED ROPE END. USED WITH HOSE-CHAIN-CORE ROPE (as shown). COVERED WITH VELOUR. WILL OUTWEAR ANY OTHER TYPE ROPE RAIL
#9—DOOR GUARD
#20 SAND URN
Ht. 14"; Dia. 10"; Wt. 7 lbs.
#21 SAND URN
Ht. 18"; Dia. 10"; Wt. 11 lbs.
BRONZE or CHROME
HAND RAIL BRONZE or CHROME
#8 TRIPLE DOOR GUARDS BRASS or CHROME
#7 CAST BRONZE DOOR GRIP
#310 PORTABLE POST HEAVY LOADED BASE (Wt. 42 lbs.) BRONZE OR CHROME
KICK PLATES BRASS-BRONZE-ALUMINUM
GRILLES—Various Types made to individual requirements
In bronze, steel, stainless steel, aluminum and other commercially rolled metals. Also furnished to match existing finishes
THRESHOLDS 4" and 6" BRONZE or ALUMINUM

Illustrated are merely a few of our many products • Inquiries invited

LAWRENCE METAL PRODUCTS, INC.

SUCCESSORS TO NEW YORK BRASS & WIRE WORKS COMPANY

434 BROADWAY • *CAnal 6-5956* • *Est. 1881* • **NEW YORK 13, N. Y.**

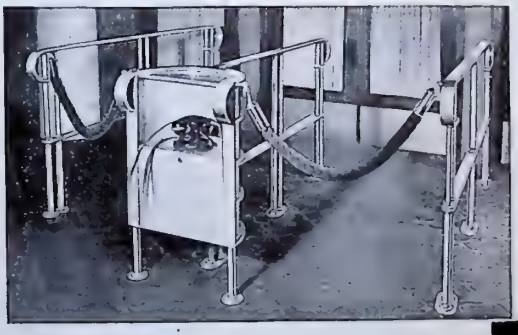
RAMCO for QUALITY

POSTER DISPLAYS - ENTRANCES - TICKET BOOTHS - RAILS

IF YOU ARE REMODELING OR BUILDING A THEATRE

IT WILL PAY TO INVESTIGATE RAMCO'S COMPLETE LINE

PARTIAL VIEW OF REMODELED THEATRE FRONT FEATURING
RAMCO KLEER-VU DOORS, TICKET BOOTH, POSTER CASES



RAMCO TICKET RECEPTACLE WITH CUSTOM-BUILT RAILING

DISPLAYS

MODEL E
ILLUMINATED WALL DISPLAY FOR LOBBY

Ramco Features

MODERN DESIGN
ATTRACTIVE LAYOUTS
DURABILITY
ECONOMY
PERMANENCE
SERVICEABILITY
ALL METAL CONSTRUCTION
MINIMUM MAINTENANCE COSTS

MODEL C—WALL DISPLAY

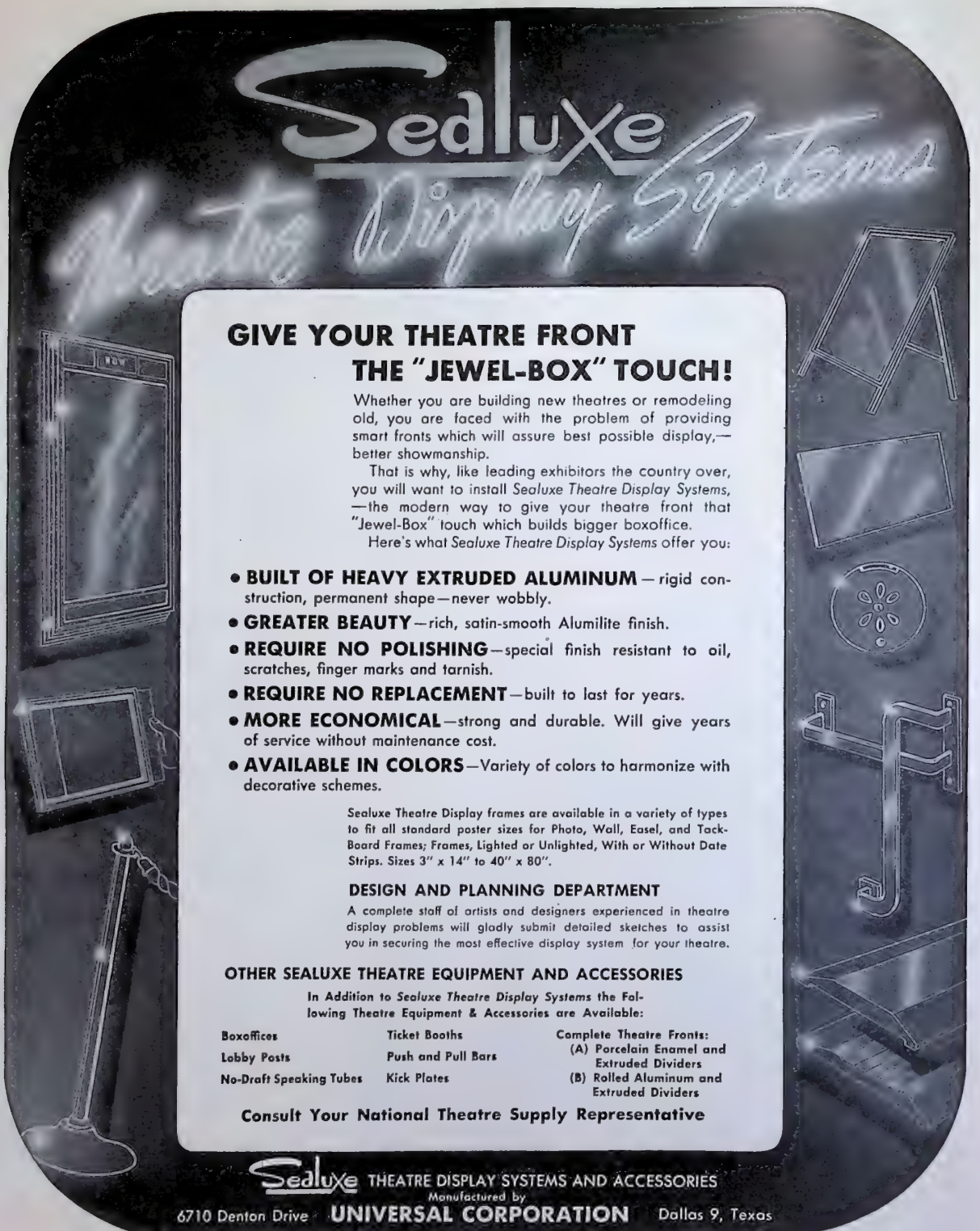
Ramco Displays

WITH
CONTINUOUS HINGES
CYLINDER LOCKS
INTERCHANGEABLE INSERTS
SURFACE OR RECESS MOUNTINGS
CONCEALED LIGHTING
WITH OR WITHOUT GLASS DOORS
WITH OR WITHOUT ILLUMINATION
STAINLESS STEEL, BRONZE, ALUMINUM

THE RELIANCE ART METAL COMPANY

595 WEST McMICKEN AVENUE • CINCINNATI 14, OHIO

Sealuxe Theatre Display Systems



GIVE YOUR THEATRE FRONT THE "JEWEL-BOX" TOUCH!

Whether you are building new theatres or remodeling old, you are faced with the problem of providing smart fronts which will assure best possible display,—better showmanship.

That is why, like leading exhibitors the country over, you will want to install *Sealuxe Theatre Display Systems*, —the modern way to give your theatre front that "Jewel-Box" touch which builds bigger boxoffice.

Here's what *Sealuxe Theatre Display Systems* offer you:

- **BUILT OF HEAVY EXTRUDED ALUMINUM**—rigid construction, permanent shape—never wobbly.
- **GREATER BEAUTY**—rich, satin-smooth Alumilite finish.
- **REQUIRE NO POLISHING**—special finish resistant to oil, scratches, finger marks and tarnish.
- **REQUIRE NO REPLACEMENT**—built to last for years.
- **MORE ECONOMICAL**—strong and durable. Will give years of service without maintenance cost.
- **AVAILABLE IN COLORS**—Variety of colors to harmonize with decorative schemes.

Sealuxe Theatre Display frames are available in a variety of types to fit all standard poster sizes for Photo, Wall, Easel, and Tack-Board Frames; Frames, Lighted or Unlighted, With or Without Date Strips. Sizes 3" x 14" to 40" x 80".

DESIGN AND PLANNING DEPARTMENT

A complete staff of artists and designers experienced in theatre display problems will gladly submit detailed sketches to assist you in securing the most effective display system for your theatre.

OTHER SEALUXE THEATRE EQUIPMENT AND ACCESSORIES

In Addition to *Sealuxe Theatre Display Systems* the Following Theatre Equipment & Accessories are Available:

Boxoffices	Ticket Booths	Complete Theatre Fronts: (A) Porcelain Enamel and Extruded Dividers
Lobby Posts	Push and Pull Bars	(B) Rolled Aluminum and Extruded Dividers
No-Draft Speaking Tubes	Kick Plates	

Consult Your National Theatre Supply Representative

Sealuxe THEATRE DISPLAY SYSTEMS AND ACCESSORIES
Manufactured by
6710 Denton Drive **UNIVERSAL CORPORATION** Dallas 9, Texas

Distributed by

NATIONAL THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.

A UNIT OF NATIONAL STANDARD THEATRE EQUIPMENT

Here are your salesmen!

Your theatre front meets the public, shakes hands with them for you, and invites them inside. If successful, it converts them into patrons. The finest theatre equipment *inside* is worthless without effective attraction power *outside*. Poblocki complete fronts, marquees, box offices and poster cases are specifically designed to do that job.

- *Stainless steel construction*
- *Cold cathode round-the-case lighting*
- *Watertight doors*

- *"10 second" set screw, for fast door removal*
- *Completely wired and assembled*
- *Ready for simple immediate installation*

When you fit them into your present front, incorporate them into a modernization project, or utilize them as component parts of a new Poblocki complete front, these poster cases are as effective and practical as they are beautiful. Available in a 40" x 65" stock size, or specifically designed to your requirements.

The box office above is one of many beautifully designed box offices erected by the Poblocki firm in the past year. Available in vari-colored porcelain, or fluted stainless steel, it contains every unit necessary for efficient operation.

Convert the Public into Patrons with

POBLOCKI

Wire or write for catalog and brochures and investigate further the finest theatre equipment available.

The Fox Oshkosh—a recently finished complete front by Poblocki, utilizing curved-to-any-radius poster cases and stainless steel box office, is a fine example of the modern inviting theatre front.

BEN B. POBLOCKI & SONS CO.

2159 S. KINNICKINNIC AVE. •• MILWAUKEE 7, WISC.

More Sales at the Box Office

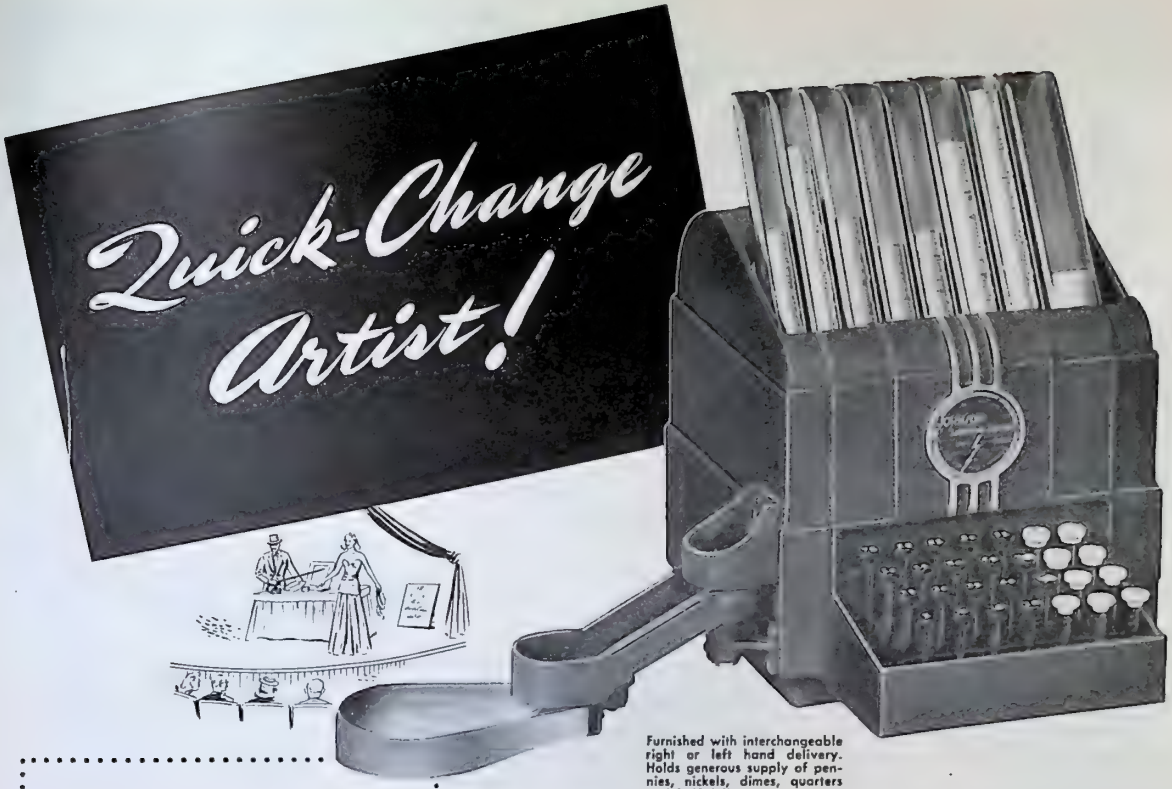
She smiles, and keeps on smiling —this box office beauty in the Cramer High Model Posture Chair, and it means more sales at the ticket window. But let's give additional credit where it's due.....first, to her wise boss for knowing that perfect posture and other anti-fatigue features are built right into each Cramer Posture Chair. A big hand, too, for the Cramer engineers and Cramer comfort craftsmen who offer you the finest chairs that seating science can devise..... chairs that combine AIRFLOW comfort with advanced design and durable beauty. From the box office beauty to the big boss—there's a Cramer Posture Chair for every seated worker.

Cramer

airflow

POSTURE CHAIR COMPANY, INC.

1205 CHARLOTTE STREET • KANSAS CITY 6, MO.



Furnished with interchangeable right or left hand delivery. Holds generous supply of pennies, nickels, dimes, quarters and half-dollars.

Meets Every Coin-Changing Requirement!

- ✓ **FAST**—Lightning-like action
- ✓ **ACCURATE**—Exclusive design assures accurate coin control
- ✓ **EASY TO OPERATE**—Simplified light touch keyboard facilitates operation
- ✓ **STURDY**—Reinforced construction provides long, trouble-free service
- ✓ **EFFICIENT** — Designed primarily for theatres to meet box office requirements
- ✓ **DEPENDABLE**—You can rely on its lightning-like accuracy year after year
- ✓ **MODERN DESIGN**—Advanced styling, beautiful finish
- ✓ **ECONOMICAL** — Saves money through its speed, accuracy and durability

Advantages like these make the JOHNSON LIGHTNING CASHIER a must for more profitable box office operation.

Advanced Series

JOHNSON LIGHTNING CASHIER

Box office headaches disappear when this amazingly accurate JOHNSON LIGHTNING CASHIER is on the job! Designed by America's leading money-metering engineers, it is built to make correct change fast . . . stop short-change and over-change . . . and handle rush hour crowds without extra help. The JOHNSON LIGHTNING CASHIER does the "brain work" as well as the labor. Subtracts total admission from the amount tendered, returns exact change instantly, keeps patrons happy and reduces shortages in your receipts and actually pays for itself through its savings. Find out today how you can step up box office efficiency with this dependable JOHNSON equipment.

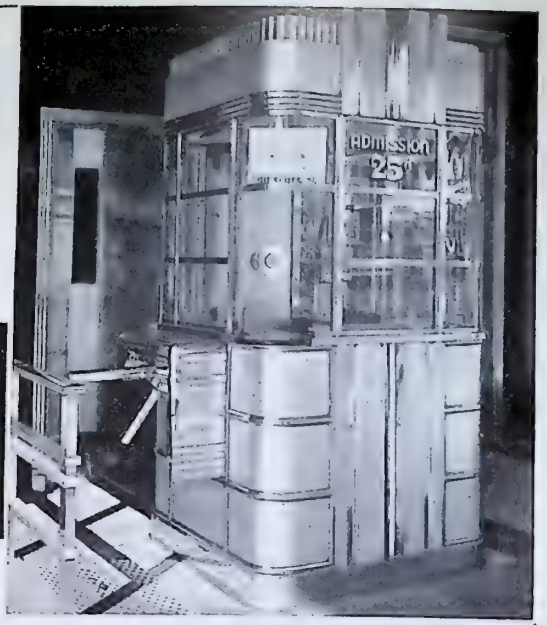
FULL DETAILS ARE YOURS FOR THE ASKING. WRITE TODAY!

JOHNSON FARE BOX COMPANY
4619 N. RAVENSWOOD AVE., CHICAGO 40, ILL.
420 LEXINGTON AVE., NEW YORK 17, N. Y.

For tighter

CONTROL OVER YOUR BOXOFFICE

THE PEREY "Magic Barrier" TURNSTILE SYSTEM

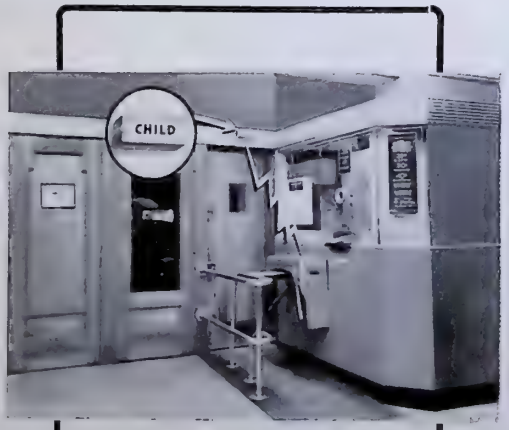


The only turnstile system on the market designed especially to meet theatre conditions

- Assures an automatic registered count on every admission, so accurate that it is acceptable to the Internal Revenue Department for tax purposes.
- Cuts your payroll by eliminating the necessity of ticket-takers.
- Eliminates the need of costly ticket machines, ticket choppers and tickets. The money you have been paying out for these items can be extra profit.
- Prevents pilfering by affording a reliable check against cashiers' receipts.
- Stops gate-crashing. The cashier can instantly lock the machine.
- Ends friendly invitations to "walk-ins."
- Foregoes ticket manipulation schemes, possible with cashier-doorman combinations.
- Makes the cashier's job much easier and permits closer attention to correct change-making.

WHEREVER PEREY SYSTEMS HAVE BEEN INSTALLED THE INCREASE IN PROFITS HAS PAID FOR THE TURNSTILES IN A FEW WEEKS

- Handles peak business faster, automatically guiding patrons from the boxoffice to the entrance, and avoiding the confusion caused by parties becoming separated at the entrance.



- A separate register is provided for price differential between adults and children, and a conspicuous indicator lights up on all child admissions, preventing the juggling of adult and children admissions by the cashier.
- Readings of the tamper-proof register are easily and quickly taken at the time of any change in admission scale.

- Satisfies strictest fire department requirements. The entrance becomes a non-registering, additional exit in case of emergency.
- A locking arrangement prevents entrance when the theatre is closed for the night.
- Well constructed to assure constant use without failure.
- Modern and showmanlike in appearance.
- Hung on the wall, the machine takes little space, and may be installed anywhere regardless of the slope of the floor.

The services of Perey Application Engineers are at your disposal. They have designed systems to meet every admission condition and fit every lobby, whether the boxoffice be at the right, left or center.

A few theatre users: Mercury (Buffalo), Tryon (Charlotte), Campus (Lewisburg), Colony (Raleigh), Hitching Post (Los Angeles), Round Up (San Francisco), Pix (Norfolk), Grand Central, Airline News, Concourse (New York), Trans-Lux, Newsreel, Pix and Visulite Theatres everywhere.

WRITE TODAY FOR DETAILS

THE PEREY TURNSTILE COMPANY

101 PARK AVENUE • NEW YORK 17, N. Y.

BRIGHTER and EASIER TO CLEAN!

SURFACES covered with Formica about the entrance to the theatre—ticket booth panels, doors, lobby wall paneling—are brighter and more theatrical, more thrilling than other available materials could make them.

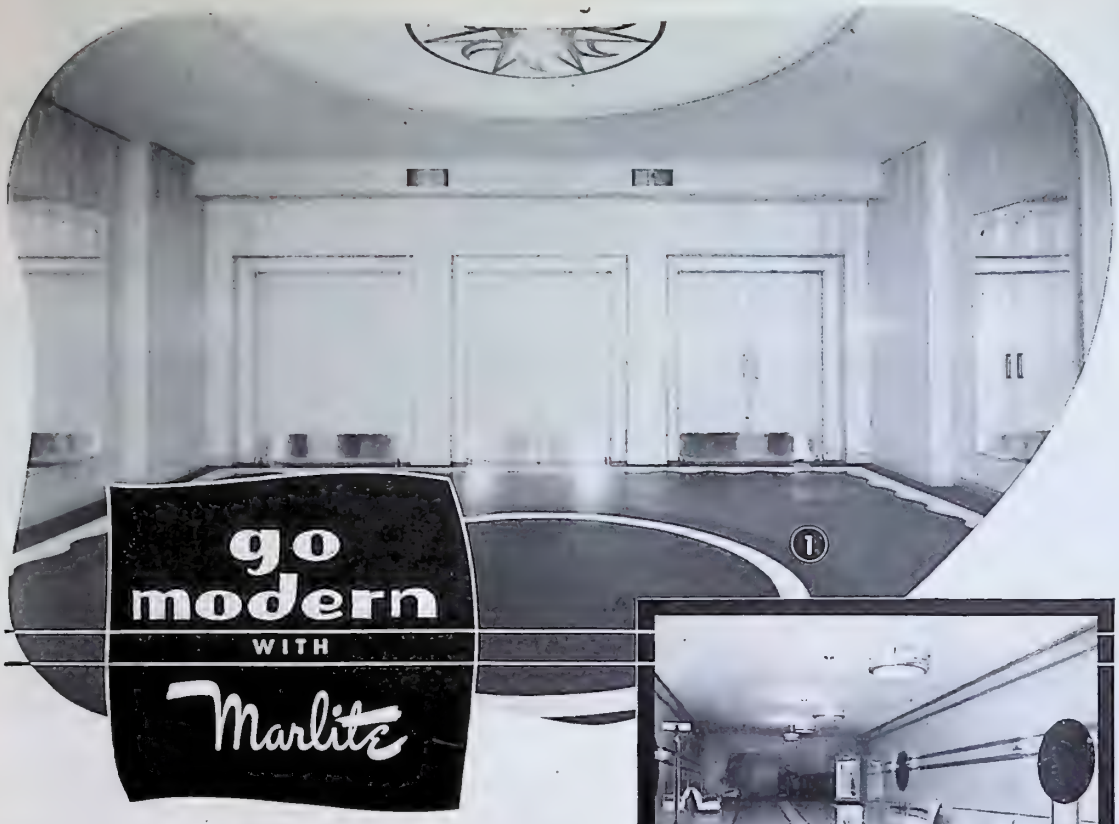
They stay that way through years of uninterrupted use with a minimum of cleaning and attention. For this decorative material is non-porous and very easy to clean.

The surface is uninjured by washing with soap and water. Usually wiping with a damp cloth is sufficient to restore the original intensity and beauty of the colors.

These colors come in the widest range of shades and patterns. The material is simply and inexpensively installed by carpenters. No wonder the leading theatre architects have fixed on Formica as the ideal modern decorative material for theatres.

FORMICA
TRADE MARK REG. U.S. PAT. OFF.

THE FORMICA INSULATION COMPANY, 4066 SPRING GROVE AVE., CINCINNATI 32, OHIO



Long-life beauty for theater walls and ceilings is easy to achieve with lustrous Marlite . . . the colorful, plastic-finished paneling that's easy to install, easy to keep clean.

There's box office, too, in Marlite. Smartness in decoration keeps the crowds coming back. Marlite is ideal for foyer, lobby, powder and smoking rooms, and offices.

And Marlite lasts! Colors **stay** bright. Maintenance is easy, for Marlite is **permanently** sealed against deterioration from dirt, cosmetics and human hair oil. Marlite **never** needs refinishing, is quickly cleaned with a damp, soapy cloth.

Choose from a wide range of patterns and colors. Ask your architect or building supply dealer for complete details, or write factory direct. We can't promise immediate delivery, but plan NOW to use Marlite when it is available. You'll be glad you did.

1 *Foyer of Grand Theater, Lancaster, Pa.*

2 *Foyer of Emery Theater, Reading, O.*

3 *Obsolete powder room of Hippodrome Theatre, Marietta, Ohio, was transformed easily and quickly by using Marlite panels in two contrasting colors, Orchid and Black. Now sanitary and sparkling!*

EASY TO INSTALL. Marlite panels are wall-size and are quickly cut to your specifications with ordinary carpenter tools. In re-modeling, remember that Marlite can be securely bonded to old walls. There's less time lost . . . with greater savings . . . when you specify Marlite. And installations stay trim . . . there's no buckling or warping.

MARSH MOULDINGS, WASHROOM ACCESSORIES. *Designed to harmonize with the colorful beauty of Marlite are complete lines of Marsh mouldings and washrooms accessories . . . now immediately available. Mouldings are provided in extruded aluminum, plastic and presdwood in a variety of patterns. Marsh chromium accessories for powder and smoking rooms provide that all-important modern touch.*

Marlite
REG. U.S. PAT. OFF.

PLASTIC-FINISHED
Wall Panels

MARSH WALL PRODUCTS, INC., 1282 Main Street, Dover, Ohio

FOR CREATING BEAUTIFUL INTERIORS

THABET

ENAMEL ON ALUMINUM

Wall Tile and Panels

The World's Finest Finish on Metal

FOR

THEATRE FRONTS · LOBBIES · REST ROOMS

BOXOFFICES · LOUNGES · OFFICES · SHOPS

—of Economical, Long Lasting Beauty

RUST-PROOF
SCRATCH-PROOF
MAR-PROOF
CRAZE-PROOF

CHIP-PROOF
MOISTURE-PROOF
GLARE-FREE

ACID-
ALKALI-
ALCOHOL-
RESISTANT

WITHSTANDS EXTREMELY HOT AND EXTREMELY COLD TEMPERATURES

EASY TO APPLY

Light in weight, Thabet Tile is applied with a temperature- and moisture-proof cement mastic, troweled ¼" thick. Moldings are used around each wall panel.

NATURAL APPEARING MARBLE AND WOOD GRAIN FINISHES

A Variety of Satin-Smooth Finishes

Solid pastel colors in peach, cream, grey, blue, green and yellow.

Trim colors in black, red, dubonnet and pine green.

The variety of designs which can be employed by the use of combinations of colors and trims is unlimited.

BORN TO BE TOUGH

The finishes are actually metals with oils and thinners added to make them flow onto the aluminum. A permanent bond is rendered by making these metals compatible with the metal base. The finish is baked at 400° F. in a 150,000-watt infra-red oven, a thick protective film coating of vinyl resin plastic applied, rebaked at 400° F. in a 125,000-watt oven until fully cured, and a pressure of 36,000 pounds applied — a pressure far greater than any impact the finish will encounter after application.

AVAILABLE IN ALL THESE SIZES

THABET WALL PANELS: 16" x 16" — 16" x 24" — 32" x 48".

THABET WALL TILE: 5" x 5" — 2-1/2" x 5" — 5" x 7-1/2" — 2-1/2" x 2-1/2" — 5/8" x 5" and diagonals of all of the above with exception of the 5/8" x 5".

Send for further details

THABET MANUFACTURING CO.

628 Huron Street • Toledo 4, Ohio

AMERICAN MAT CORPORATION

"America's Largest Matting Specialists"

1721 Adams Street • Toledo 2, Ohio

A COMPLETE LINE OF FLOOR MATTING

For Promoting Safety • Providing Comfort • Reducing Fatigue • Furthering Sanitation

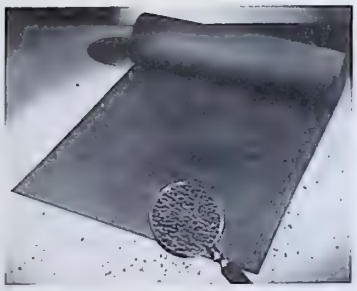
AT ALL POINTS IN THE THEATRE

For Modernizing and Beautifying Lobbies

EZY-RUG RUBBER LINK MATTING

Traps all dirt at the door, keeps it out of sight and prevents tracking through the theatre, thus reducing cleaning costs and frequency of redecorating, necessitated by dirt whirled into the air by the heating and ventilating systems. Beveled edges. Reversible, its life is doubled. Available with lettering and designs.

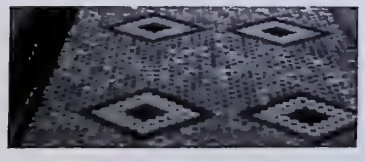
For Aisles and Carpet Protection



"WALRUS HIDE" ROLL RUBBER MATTING

A fine matting with a beautiful top surface which looks like high quality black walrus hide leather. 36" wide, ⅛" thick. Comes in rolls of approximately 50 yards.

For Entrances, Lobby Approaches and Wet Floors



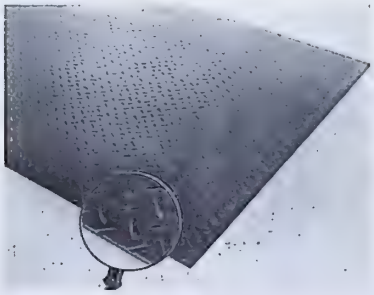
TUF-TRED TIRE FABRIC MATTING

A long-wearing, economical, superior grade matting which provides a quiet, resilient walking surface. Patented beveled nosing, usable on all four sides. ⅜" thick, up to 6' wide, any length.

For Use in Front of Exposed Switches

RUBBER SWITCHBOARD MATTING

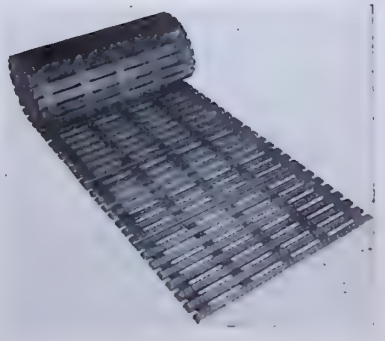
For Stairs and in Front of Boxoffices



AMERITRED SOLID PLASTIC FRICTION MATTING

Provides good scrapeage. Comes in sections 29" x 62" x 9/64" which can be laid side by side for larger, or trimmed for smaller or odd shaped areas.

For Back of Candy Counters and Around Popcorn Machines



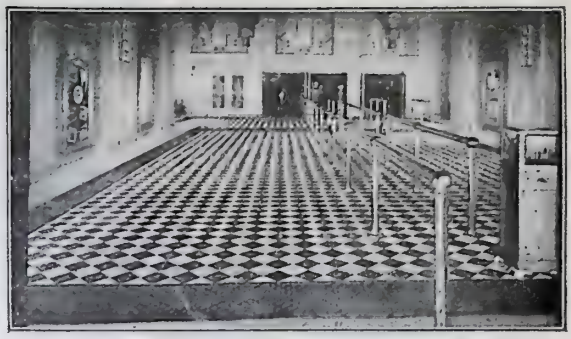
AMERICAN COUNTER-TRED MATTING

A tough, durable, rubber and cord matting with a resilient non-slip surface. Easily handled for cleaning. ⅜" thick, 24" wide, any length.

Write for prices and folder "A Mat for Every Purpose"

LORRAINE RUBBER PRODUCTS

Pioneers of Attractive Theatre Installations



THE MODERN MAT IN COLORS

Decorative, colorful entrances and lobbies enhance the appearance of your theatre and make it glamorous as well as safe and sanitary.

25 Years of leadership in the rubber industry, modernizing lobbies and entrances of smart theatres and institutions has given us wide experience and understanding of your requirements. Lorraine matting is internationally recognized for *better* quality, *better* durability, *better* beauty and for its wide range of smart colors. Everything is executed with scientific precision and to strictest specifications. All work guaranteed.

We are equipped to interpret any special theme or idea of your architect, designer or decorator. Our Planning and Designing Dept. comprises engineers, draftsmen, chemists, artists and designers, specialists in all phases of theatre problems, and will gladly assist you in your particular requirements and advise you on any rubber information you desire.

STANDARD CORRUGATED RUBBER MATTING

Lorraine's standard black or maroon matting is made of durable high quality rubber which retains its vitality and lustre at all times.

RUBBER ENTRANCE MATS WITH LETTERING

Individually designed with your name, reflecting an air of dignity and distinctiveness to your entrance. The utmost in style and beauty.

PRODUCTS *of* DISTINCTION

- Perforated and corrugated rubber mats of all types. Solid corrugated or smooth surface in various colors and designs.
- Corrugated matting in black or maroon.
- Stair treads in plain colors. Solid smooth or corrugated with inset or outside borders of contrasting colors.
- All designs or lettering are inlaid half way through depth of mat.
- Curved nosing stair treads, black or maroon. 1/8", 3/16" thickness.
- Mechanical Rubber Goods — Air Hose — Steam Hose — Industrial Water Hose—Garden Hose—Linen Fire Hose—Vacuum Hose.
- Various types of safety stair nosing.
- Fountain Mats.
- Sand Urn Mats.
- Rubber Cleaner.
- Cements.
- Gaskets.
- Washers.
- Extruded rubber.
- Machine cut parts.
- Molded goods and parts.
- Link Mats—in leather, wood or rubber.
- Machine ground rubber parts.
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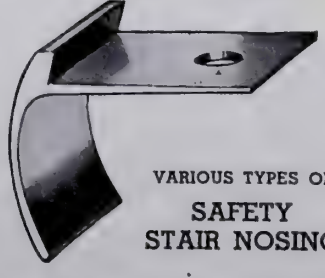

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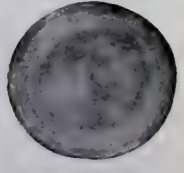

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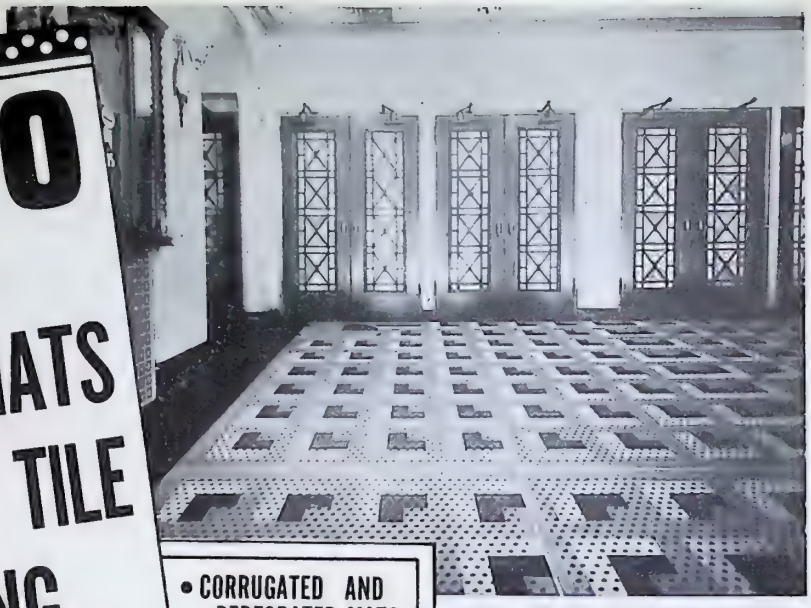

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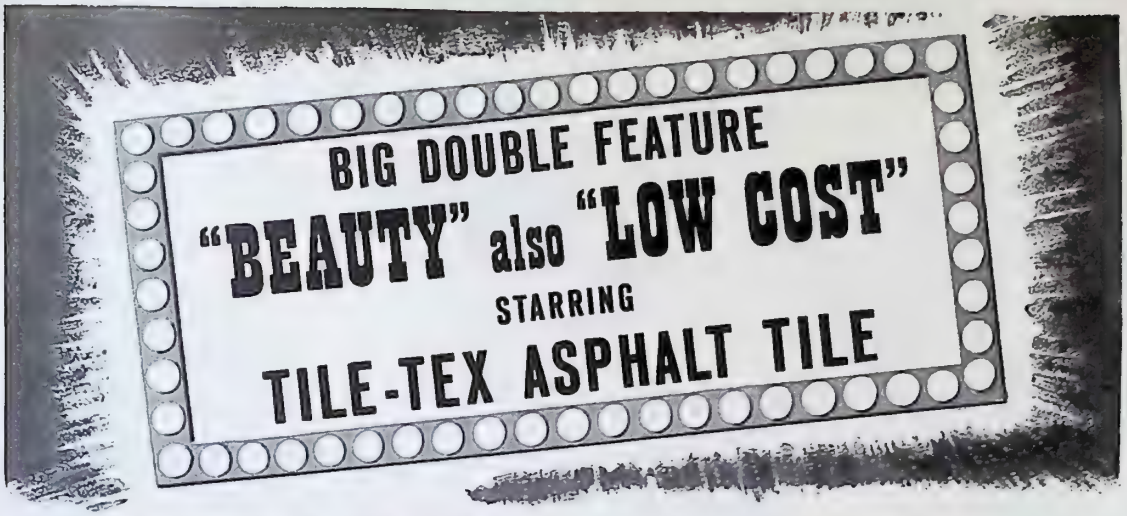

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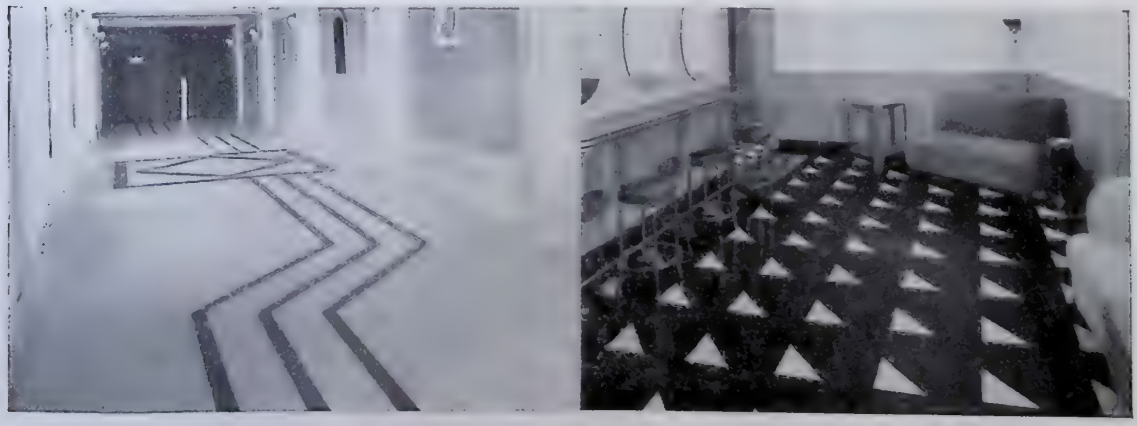

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AUDITORIUM and STAGE
1946-47

Use of Black Light in Theatre Decoration

Principles of Fluorescence Are Set Forth Along with Methods of Using Black Light

ROBERT C. SWITZER
President of Switzer Brothers, Inc.

The use of black light in theatre decoration has passed the experimental period. By necessity, most of the installations made prior to the war were largely the product of enthusiasm and imagination. Architects, decorators, and designers recognized the dramatic possibilities in this newest of media as soon as it was offered to the amusement world. Here, they saw instantly, was something really new with which to capture the fancy of a public grown increasingly hard to impress, even with the most lavish use of orthodox methods and materials. There were, of course, no textbooks to guide them in decorating theatres with black light. So they pioneered, in the best American tradition, and it is a tribute to their imaginative capacity and their technical ability that they revolutionized theatre decoration, almost overnight.

Initial applications of most discoveries are made in a timid and somewhat awkward fashion. Not so with black light in the theatres! From coast to coast, in comunities large and small, the newest of decorative media was employed so effectively that it won unprecedented acclaim from theatre goers, who promptly clamored for more.

The war prevented immediate satisfaction of that demand. It also afforded a unique testing period for the black-light installations made prior to the conflict. There has been time for all concerned to study those installations in actual, year-after-year use; to check on any shortcomings, to appraise missed opportunities, and to chart future improvements. Today, in consequence, at a moment when theatre management is planning the greatest program of renovation and new construction in the history of entertainment, tested principles and methods are available as a guide to the effective employment of black light.

Those who know the most about this newest form of theatre decoration are the readiest to admit that its possibilities far outweigh the most brilliant successes achieved in its use to date. In its application to the needs of the theatre, black light is an art, and art never stands still. The perfect picture has yet to be painted. The perfect masterpiece of music is still to be composed. It is reasonable to assume, therefore, that perfection in black-light decorations is still some distance in the future. But from now on, the architect and the decorator have something more than enthusiasm and imagination to work with in handling fluorescent materials. Experience and observation are also theirs to command. It is the purpose of this article to suggest and to review some of the basic considerations which have been found to determine the effectiveness of their efforts in this newest of fields.

WIDE CHOICE OF APPLICATIONS

As soon as the decision has been reached to include black light in the decorative scheme of a theatre, the question naturally arises, "Where and how can it be employed to greatest advantage?" In order to arrive at a satisfactory answer, it is important to begin with the realization that decoration—any kind of decoration—is part of the entertainment which the public buys at the box office. In his own mind, of course, the average movie patron purchases a ticket solely to see a picture. It is not difficult, however, to calculate what his reaction would be if the picture were presented to him in an unadorned, barn-like hall, as in the days of the Nickelo-

FIGURE 1—The murals of the Fairmount Theatre, Cleveland, Ohio, are shown here. The walls of the auditorium are covered with parallel bands of coral and turquoise velour, separated by horizontal bars, designed to lead the eye to these massive fluorescent murals which are located slightly forward of center on the side walls of the theatre. The allegorical figures on the two murals are executed in fluorescent blue and orange on a background of black velour. There are no other decorations in the auditorium, yet the effect is one of great richness, compared with the feeling of spaciousness which is the goal of modern theatre designing.

deon. Although he may not himself be aware of it, the movie patron is an escapist seeking relaxation or excitement or both in a world of make-believe. The atmosphere of the theatre, therefore, contributes importantly to the satisfaction of his desires. The true function of decoration is to create an atmosphere which will draw him back to your theatre again and again.

Black light performs this function to an altogether remarkable degree. To the uninitiated—and, it must be admitted, even to those in the know—there is never-ending fascination in the decorations that glow with colorful light which has no visible source. This is Theatre with a capital T, and its possible applications are almost limitless in number and variety.

The spectacular change of atmosphere noted in a theatre auditorium upon installation of black-light decorations may be so outstanding as to create the impression of a complete remodeling. This affords an unexcelled opportunity, in this day of shortages, in the many theatres now in need of renovation. Surprisingly, all the black-light equipment and fluorescent materials necessary are readily available.

IN AUDITORIUMS

Black light is most effective and is easiest to use in darkened or semi-darkened surroundings. First choice of a location for its employment in a motion-picture house inevitably falls, therefore, upon the auditorium of the theatre, where experience has demonstrated that it can be utilized in many ways. Walls and ceiling lend themselves equally well to black-light treatment in the form of murals rendered in fluorescent paints. The placement, the size and the design of such murals depend upon the size and style of the auditorium, as well as upon artistic and financial considerations. In earlier installations, when architects and decorators were feeling their way in the use of this new medium, fluorescent murals were frequently treated as a secondary or supporting part of the decorative scheme, but as practice has brought confidence and skill, fluorescence has been given the dominant role in the embellishment of many theatres.

Such is the case with the fluorescent murals of the Fairmount Theatre, shown in Figure 1. The Fairmount is located on the boundary line of two of Cleveland's most highly restricted residential suburbs, and having been the last motion-picture house built in Ohio before the war halted all construction, its layout and design embody many original and distinctive features. The walls of the auditorium are covered with parallel bands of coral and turquoise velour, separated by horizontal bars designed to lead the eye to massive fluorescent murals which are located slightly forward of center, on the sidewalls of the theatre. The allegorical figures on the two murals are executed in brilliant fluorescent blue and orange Glo-Craft colors on a background of black velour. There are no other wall decorations in the auditorium, yet the effect is one of great richness, combined with the feeling of spaciousness which is the goal of modern theatre design.

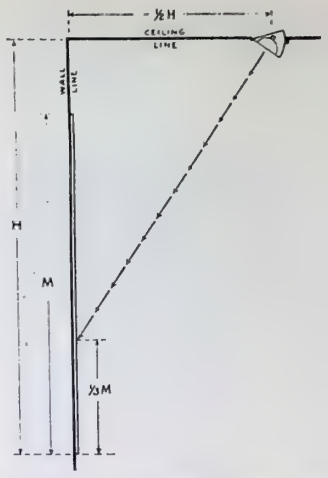


FIGURE 2—The proper method of placing recessed black lights for perfect lighting of fluorescent murals is shown, together with an indication of the critical measures needed for proper planning.

Each of the murals at the Fairmount is 12 feet high and 22 feet long. Each is activated by Glo-Craft 250-watt black lights, recess mounted in the ceiling with adapters which direct a flood of near-ultraviolet radiations full on the fluorescent painting.

Sanford Greenberg, assistant manager of the theatre, states that, although the fluorescent murals have been in daily use ever since the Fairmount opened in May, 1942, they continue to excite the admiring curiosity of patrons who invariably ask "Where does the light come from?" Greenberg also states that the murals have retained their original brightness, although the only attention they have demanded has been the normal replacement of lamps and periodic cleaning of the lamp filters and of the mural surfaces.

Fluorescent murals have been given an even more dominant place in the decoration of the nearby Shaker Theatre (see Figure 3) which likewise serves several of Cleveland's elite eastern suburbs. The Shaker's murals rank with the largest in the entire United States. Mounted above a dado of normal height and reaching to the ceiling of the theatre, they are 90 feet long and extend in an unbroken sweep from the standee area almost to the proscenium wall. They are stepped down to conform to the floor-level of the theatre as it descends from rear to front. Both murals depict gold, blue and red figures of the Muses and Pegasus against a background of soft gray velour. Fluorescent activation is furnished by a series of Glo-Craft's 250-watt, recess-mounted black lights in adapters.

Ray Allison, manager of the Shaker Theatre ever since it was opened in 1936, feels it is worthy of note that his fluorescent murals were installed as the major feature of a complete remodeling program in 1941. They wrought such a complete change and so improved the appearance of the theatre that they gave him, to all intents and purposes, a new house. A stranger, entering the Shaker in 1946, finds it hard to believe that the theatre is 10 years old. The point is of particular significance today, when building restrictions have brought new construction to a standstill. Black light offers a demonstrated means of creating new theatres out of old ones and all the necessary materials are immediately available, without restrictions or limitations of any kind.

In this connection, it is to be emphasized, moreover, that black-light decoration is in no wise limited to wall murals in the auditorium. Ceilings are equally well adapted to the purpose. Ceiling murals, activated by black lights mounted on the walls or concealed in decorative urns, are in use in many theatres, while in others entire ceilings have been treated with fluorescent paints so that they glow with soft, colorful light which furnishes all the necessary running illumination. In still other instances, entire prosceniums have been outlined successfully in fluorescent patterns. Patrons have also registered emphatic approval when the proscenium is flanked by fluorescent panels which reduce the contrast between the brightness of the screen and the darkness of adjacent areas. This device serves to rest the eyes and thus contributes to the pleasure of viewing the picture.

The use of near-proscenium panels, it should be noted, may violate one of the basic rules for success with black light; namely, that fluorescent areas are to be placed where the bright light from the screen will not "wash" them out. This difficulty is readily overcome by setting the proscenium panels at an angle which prevents screen light from striking them directly, or by building columns or other artificial architectural structures which will effectively place them in shadow. Even with sidewall murals, it is a wise precaution to provide a greater amount of black light for areas close to the screen in order to assure an even over-all effect in the auditorium.

FOYER AND PUBLIC ROOMS

The progressive theatre owner aims to have reason for pride in the entire building. He recognizes that the effect of a handsome auditorium is largely nullified by a mediocre foyer or commonplace powder room. Public safety demands adequate lighting in the foyer, of course, but architects and decorators who are skilled in the use of fluorescence have no difficulty in utilizing it for ceiling areas and for fountain niches anywhere in a theatre. Fascinating third-dimensional effects are easily achieved by the correct use of background colors; fluorescent areas seem to stand out and away from backgrounds which are non-fluorescent. By this means, statuary may be literally painted on a flat wall surface and will appear to be done in high relief when exposed to black light.

MATERIALS FOR BLACK-LIGHT EFFECTS

Any type of material ordinarily employed for wall and ceiling surfaces in theatre construction is suitable for fluorescent treatment. Wood, plaster, wallboard of various kinds, textile fabrics, glass, and metal have all been used successfully. Some of the most striking fluorescent murals in the Mid-West—those of the Mercury Theatre in Detroit—are painted in part on the metal grille-

work of the ventilating ducts. The huge murals of the Shaker Theatre in surburban Cleveland (see Figure 3) were painted on velour in New York City. Each of these 90-foot paintings was rendered on a single strip of the velour, which was then rolled for shipment to the theatre, where it was retouched after being mounted on the wall of the auditorium.

In the opinion of a growing number of artists, velour is the ideal background for mural paintings, particularly where fluorescent lacquer-enamels are selected as the medium for the rendering. It will be found that short-pile velour, either in white or a very light color, is easy to work with and helps to assure maximum brightness of the fluorescent paints. Some artists prefer the softer effects which can be achieved with long-pile velours, but the technique of application is more difficult. In either case, if white velour is used, the lacquer-enamels are applied directly by spray-gun or brush, and darks are created by coating out other areas with non-fluorescent colors.

In addition to fluorescent paintings, fluorescent satins offer superb possibilities for theatre decoration. As the result of war research, these satins have been greatly improved and now possess a highly desirable richness of color and texture. The all-important feminine patrons of the theatre will not fail to see and admire the lustrous beauty of these new fabrics if they are used as part of the black-light decorations.

In summing up this phase of the subject, it may fairly be noted that while fluorescence has been used with great skill and imagination for decorative purposes in many theatres, there is no instance in which its maximum possibilities have been developed within a single building. There is not yet a "black light theatre" in the full sense of the phrase. The designing and creating of such a theatre is the challenge of the future for all who work in this field.

LIGHTING REQUIREMENTS

The most beautiful work of art will not be appreciated unless it can be clearly and plainly seen. Proper lighting of fluorescent decorations is essential to their success, because the invisible black light used for this purpose is a form of radiant energy. This energy performs the function of exciting or activating the fluorescent materials present in fluorescent paints or fabrics so that they emit visible light. A sewing machine motor will not develop sufficient power or energy to operate an electric washer. Similarly, low-wattage black lights may provide enough radiant energy for small-area decorations under carefully regulated conditions. It should be accepted as a fixed principle, however, that murals which exceed approximately 6 feet in one dimension or 30 square feet in area will require 250-watt black lights to be effective. In short, fluorescent decorations should be literally saturated in a flood of black light, pouring full upon them from units placed at a scientifically calculated angle. In general, this angle should be such that the center of the beam is directed at a point approximately one-third of the distance from the bottom to the top of a wall mural.

The proper method of placing recessed black lights for perfect lighting of fluorescent wall murals is shown herewith (Figure 2). Here, the ideal distance from the wall at which the black-light source should be placed is determined by taking one-half of h, which is the distance from the bottom of the mural to the ceiling. In the case of a 14-foot mural which runs up to a point 3 feet from the ceiling, h would thus equal 17 feet. Hence, the unit would preferably be located one-half of 17 feet, or 8½ feet from the wall line.

Although satisfactory results are often achieved when the black lights are placed otherwise, mounting them at a distance of $\frac{1}{2}h$, or as near to it as architecture permits, will assure maximum brightness of the fluorescent decorations. Furthermore, $\frac{1}{2}h$ should not exceed 10 feet and units should be spaced not more than 10 feet apart, preferably less.

These same principles apply to the activation of ceiling decorations from black lights mounted in wall positions. The diagram shown in Figure 2 may be used to plan the black lighting of ceiling decorations by interchanging the "wall" and "ceiling" lines.

Angle mounting, as illustrated, is simplified by the use of adapters which have been designed and manufactured especially for this purpose. The adapter shown in Figure 4 is adjustable so that it permits the tilting of the recessed black light after installation to the point where it produces the maximum brightness from the fluorescent surface being activated.

The exercise of care in placing and

FIGURE 3—Fluorescent murals have been given an even more dominent place in the decoration of the Shaker Theatre, not far from the Fairmount (see Figure 1). These murals rank with the largest in the United States. Mounted above a dado of normal height and reaching to the ceiling of the theatre, they are 90 feet long and extend in an unbroken sweep from the standee area almost to the proscenium wall. They are stepped down to conform to the floor level of the theatre, as it descends from the rear to the front. Both murals depict gold, blue, and red figures of the Muses and Pegasus against a background of soft gray velour. Activators are recessed.

directing the black lights will also minimize the likelihood of any of the near-ultraviolet rays spilling over the edges of the fluorescent mural or other decoration and annoying patrons of the theatre. The rays are harmless, but they may cause a temporary fuzziness of vision if they are directed into a patron's eyes. This problem does not arise when the black lights are properly aimed at the surfaces they are intended to cover. For this same reason, it is important to make sure that the bottom or lowest point of any sidewall mural is far above the normal head-level of patrons seated near the side aisles.

Always, of course, black light installations should be tested prior to completion under the exact conditions which will prevail when they are in actual use. In the motion-picture theatre, tests made with the screen dark are no tests at all. Although fluorescent paintings may exhibit satisfactory brightness under these circumstances, some of the effects of the fluorescence might be masked out when the light from the projector is reflected from the screen. Make the test with the projector in use, or if this is impossible, create similar conditions by directing other strong lights upon the screen.

WATCH THE WIRING

Just as an adequate number of black lights of the requisite wattage, correctly placed, is essential for the maximum effectiveness of fluorescent decorations, so the black lights themselves require an adequate, sustained current flow. The installation of wiring which is too small to carry the necessary load will almost certainly result in disappointment by causing the lamps to go out periodically. The same difficulty will arise if a line is overloaded by placing too many lamps on any one circuit.

Wiring requirements depend upon the size of the individual installation and on line voltages and codes which vary in different localities. It is impossible, therefore, to set up fixed wiring rules for general application to all black light decorative installations, except that 375 watts should be used as a base for figuring wire size for use with 250-watt lamps. In no case is a wire size less than No. 12 B&S gauge recommended.

These remarks are not to be taken to mean that correct wiring is difficult in any sense. A safe rule is to get the expert recommendation of your local power company.

PAINT POINTERS

The effectiveness of any black-light display is ultimately determined by the quality — the fluorescent capacity, it might well be called—of the materials used to create the fluorescent decorations. The most efficient black lights cannot and will not produce brilliance in a painting unless the brilliance is inherent in the paints themselves. In this respect today's theatre owners are particularly fortunate because out of wartime color research for the Armed Forces there have come basis improvements in fluorescent paints, making possible a corresponding advance in the decorator's art.

There are now available, in twelve colors, pigmented paints with fluorescent properties which give them unexampled brilliance and beauty. These improved fluorescent lacquer-enamels are so lightfast that they can safely be exposed to the most powerful of black-light installations with the assurance that they will not fade. Indeed, in some colors, they are genuinely artistic combining extraordinary brightness with a soft suede finish, so that they are wholly free from undesirable gloss and glare. Their working qualities have likewise been improved to such an extent that they have the flexibility of general utility paints.

These new-type lacquer-enamels have an opaqueness which permits them to be applied successfully over backgrounds of any color—even over the darkest surfaces if several coats are put on with adequate drying time allowed between them. The application of several coats intensifies the fluorescent brilliance of the colors. Primers are unnecessary and the paints may be flowed on with a full brush, or applied with an air brush or regular spray equipment.

Post-war innovations also include fluorescent water colors. Black-light decorations executed in these new paints have a bold, arresting beauty which is ideal for theatrical purposes.

No new technique is required for their use. Fluorescent water colors bond well to any surface that wets with water and it is necessary only that they be applied over a white surface. White casein, poster paints, or temperas may all be utilized for this purpose. In addition, it is advisable to use two or more coats of the water colors themselves in order to get depth of color and maximum fluorescence.

Both as lacquer-enamels and as water colors, these improved paints are available in a complete range of twelve colors. The artist can thus give free expression to his imaginative impulses.

Generally speaking, of course, bold figures and strong contrasts are more effective than intricate details in fluorescent paintings. The technique of the modern impressionists is ideally suited to this most modern of media.

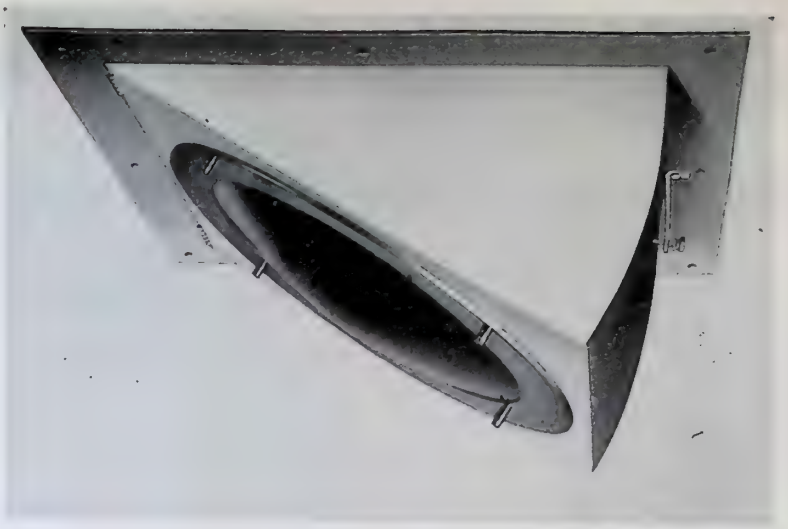


FIGURE 4—Angle mounting is simple by the use of adapters which have been designed and manufactured especially for this purpose. The adapter shown here is adjustable so that it permits the tilting of the recessed black light after installation to the point where it produces the maximum brightness from the fluorescent surface being activated. Care must be used in installing these lights. (All illustrations through Switzer Brothers, Inc.)

SUMMARY

In summation, it may be said that there are four basis requirements for success in the use of black-light decorations in the theatre: (1) Placement where other illumination is present only in a low order of brightness; (2) high-wattage black lights, closely spaced and correctly placed to saturate the fluorescent surfaces with their invisible radiations; (3) wiring that is heavy enough to supply the black lights with the maximum current they require for sustained performance at all times; and (4) fluorescent materials which possess an inherent capacity for delivering maximum brightness when fully activated.

Present conditions afford the theatre owner more than ordinary incentives for the use of black-light decorations. The quality of motion-picture productions has shown little improvement for many years past, and the recent flood of re-issues is hardly calculated to break box office records. Just over the horizon is the threat of television. The whole country, moreover, is tired of being shabby and desperately anxious for new pleasures and new thrills. There is widespread disappointment that the "new model" world of post-war wonders which the advertisements promised has failed to materialize.

Now, if ever, is the time to delight and mystify your community with the colorful spectacle of fluorescence in black light. There are tens of millions of Americans who have yet to see their first black-light mural. What an unparalleled opportunity for the progressive theatre! Where an ordinary job of decoration, no matter how lavish and costly, will command only perfunctory attention in the newspapers, black light will get headlines and feature stories. Every patron will tell the neighbors. The movies will be exciting again.

What would not Phineas T. Barnum or Flo Ziegfeld have given for black light? It is yours—now!

Effect of Painting on Acoustic Materials

The Manner of Applying Paint Is Important In Studying Effect on Acoustic Properties

V. L. CHRISLER
Physicist, National Bureau of Standards, United States Department of Commerce

One of the serious maintenance problems which arises where acoustic treatment has been used is that of cleaning and redecorating. This is particularly true where indirect lighting is used, as a dirty ceiling decreases the illumination by a considerable amount. A search through the literature reveals very little information on this subject. Books on architectural acoustics and acoustic treatment barely mention the painting of acoustic material. The only paper dealing with the subject with which the author is familiar is one by F. C. Atwood.* This article was published several years ago, and there have been many changes in acoustic materials since that time.

During the past few years a number of acoustic materials have been painted at the National Bureau of Standards and have been tested for sound absorption both before and after painting. As a result of this work, it has been found that when the materials are clean, this is, when the pores are not clogged with dirt, a number of coats of paint can be applied on many materials without seriously decreasing their sound absorption. If similar results are to be obtained on material which has been installed for several years, the dust should be cleaned thoroughly from the surface before the paint is applied.

The object of this paper is to indicate to what extent paint can be applied to different types of materials and, by a series of photographs, to show the appearance of the different surfaces before and after painting.

HOW SOUND IS ABSORBED

Before going into the details concerning the application of the paint, it is desirable to consider the different methods by which sound may be absorbed and what effect the application of paint can have on these different methods of absorption.

When one thinks of a sound-absorbent material he generally thinks of some material that is porous and in which the sound is absorbed because of the porosity of the material. A large number of the materials which are now sold as acoustic materials do depend to a considerable extent for their sound absorption on the porosity of the materials. A few of these materials have very large pores which are so interconnected that the sound absorption can be increased to a limited extent by partly closing the pore openings at the surfaces. Other materials have small openings which are not so well interconnected, with the result that the sound absorption is decreased as soon as any of the pore openings are closed. Owing to these differences, the effect of a coat of paint in changing the absorption due to porosity varies considerably for different types of material. For instance, a material with large pores may have the absorption increased by the first few coats of paint, but finally a stage will be reached where the absorption begins to decrease. The point where this loss in absorption begins depends upon the frequency of the sound, always showing up first at the higher frequencies. Materials with small ports which are not intercommunicating may have a considerable number of pores closed with the first coat of paint. In this case one would expect to find a decrease in the sound absorption of the material on painting.

Sound may also be absorbed by setting the material into damped vibration as a diaphragm, the more the damping the greater being the absorption. Likewise, a soft material may absorb sound by inelastic yielding. When the sound is absorbed by one of these methods, the effect of paint is quite different from that when it is applied to material where the absorption is entirely due to porosity.

Where there is a damped vibration of a diaphragm, the maximum absorption occurs at a frequency equal to the natural frequency of the diaphragm and the absorption decreases at frequencies both above and below the natural frequency. When paint is applied, there is a slight increase in weight and in many cases an increase in stiffness. As a result of these changes, the frequency at which maximum absorption occurs will be changed; but in some cases the average absorption may remain about the same.

When the absorption occurs in a soft material because of an inelastic yield, this can be taken as a special case of a damped vibration of a diaphragm—that is, the natural frequency has approached zero. Today it is seldom that a material of this type is found, but a few years ago a very common treatment was hair felt on which was glued a painted membrane. After a few coats of paint were applied, the pores were completely sealed. Under these conditions most of the absorption was due to an inelastic yield of the felt. In this case additional coats of paint increased the weight and stiffness of the surface membrane and, as a result, decreased the absorption of the material.

Permission to reprint the National Bureau of Standards Research Paper RP1298, together with the accompanying illustrations, has been granted by the Bureau, Hugh Odishaw, assistant to the director, Dr. E. U. Condon.

DISCUSSION OF EXPERIMENTS

Since the various methods by which sound is absorbed have been discussed, the next step is to determine how the different types of material are affected by the application of paint. All the samples described in this paper were painted with an interior flat white paint. In the past, other types of paints have been used, but the samples had not been preserved. A photographic study of those samples is therefore impossible. In examining the numerical results, it appears that approximately the same results are obtained whether a cold-water casein paint or an interior flat paint is used. It is apparent, however, that the manner in which the paint is applied is of considerable importance, except for materials having a perforated surface with the perforations so large that the paint will not film across the openings. For other materials to which the paint was applied with a spray gun, the results indicate that the paint should be applied as a fine spray and the quantity applied should not be sufficient to film across the fibers or grains in the acoustic material so as to form a solid film. A similar situation exists when the paint is applied with a brush. The paint should not be excessively thick and it should be applied in such a manner as to film across the pores as little as possible. Most of the results given in this paper are for samples to which the paint was applied with a brush, as this represents the worst condition. A much better painting job, as far as appearance is concerned, can be done on most acoustic materials with a spray gun, and as a rule the sound absorption is decreased by a smaller amount when the paint is applied with a spray gun than when applied with a brush.

The illustrations with this paper show the extent to which the paint films across different types of surfaces. Table 1 gives the sound absorption coefficients of the materials shown in the photographs before and after painting, and table 2 gives the amount of paint used. The paint used in each case was a flat white interior oil paint and is one of the well-known brands of interior paint. When the paint was applied with a brush, it was thinned slightly by adding 10 per cent of turpentine by volume, with

*National Paint, Varnish, and Lacquer Association, Washington, D. C., The Valuation of Acoustical Treatments, Circular 445 (November, 1933).

the exception of sample 7. In this case 25 per cent of turpentine by volume was added. When applied with a spray gun, the paint was thinned by adding 50 per cent of turpentine by volume. The quantities of paint given in table 2 are the quantities of mixed paint.

To determine the hiding power of the paint, it has been our practice to obtain a reasonably white surface, then to paint black stripes across the face of the acoustic material and determine the number of coats of white paint required to hide the black stripes. The results of this test are given in table 2.

Samples 1 and 2 are representative of materials made from a wood fiber similar to fine excelsior. They comply with the requirements in Federal Specification SS-A-118 for Type VII. As the surface of this material was not white, it was necessary to apply one coat of white paint before the black stripes were applied. The four additional coats of white paint indicated in table 2 failed to hide the black completely. To obtain complete hiding, it was necessary to apply one more coat of paint. If this material had been spray painted, it would have been easier to hide the black, the reason being that the black paint was applied with a ½-in. brush, which covered the sides as well as the top of the fibers. When a larger brush was used for the subsequent white coats, the tendency was to paint only the top of the fibers. If the white paint had been applied with a spray gun, it would have been possible to cover the sides of the fiber and a much better result could have been obtained with less paint.

Figure 1 shows the general appearance of this type of material. Figure 2 shows the fibrous appearance of the surface magnified about 1⅞ times. Figure 3 shows the appearance of the surface after five coats of paint have been applied with a brush.

The values of the sound-absorption coefficient for these samples given in table 1 are rather surprising. As indicated by figure 3 and shown by an examination of the material, a large number of the surface pores have been filled. As a result of this surface film, sample 1a absorbs considerably less sound at the higher frequencies than the unpainted sample. This same effect is also noticeable on sample 2a, but to a smaller degree. The most surprising result is the decided increase of absorption at 512 cycles per second. It would appear that this type of material has a structure in which the space between the fibers are so open and intercommunicating that a maximum absorption can be obtained at this frequency by partially closing the surface pores. Such a statement is not true for most of the other types of materials.

When acoustic materials are used in offices or similar places for noise reduction, it has been noticed that the sensation of quietness depends to a considerable extent upon the acoustic material being efficient at the higher frequencies. This being the case, the actual value of an acoustic treatment which might be represented by sample 1a has decreased more than would be indicated by the change of the noise coefficient from 0.60 to 0.55.

Table 1.—Sound absorption coefficients of test panels

Sample	Surface finish	Sound absorption coefficients at frequencies (cycles per second)— 128	256	512	1,024	2,048	4,096	Noise coefficients
1	Unpainted	0.09	0.24	0.62	0.89	0.73	0.73	0.60
1a	Brush painted 5 coats	.14	.49	.83	.61	.30	.22	.55
2	Painted by manufacturer	.07	.22	.54	.87	.78	.77	.60
2a	Brush painted 5 additional coats	.09	.27	.71	.92	.62	.62	.65
3	Unpainted	.11	.29	.78	.84	.75	.63	.65
3a	Brush painted 5 coats	.12	.42	.81	.74	.61	.49	.65
4	R. I. finish	.10	.30	.78	.85	.59	.42	.65
4a	Brush painted 4 coats	.08	.33	.83	.86	.53	.37	.65
5	Unpainted	.14	.51	.78	.78	.78	.82	.70
5a	Spray painted 7 coats	.18	.50	.79	.74	.71	.67	.70
5b	Brush painted 5 coats	.25	.41	.61	.47	.34	.36	.45
6	Painted by manufacturer	.07	.25	.70	.63	.53	.63	.55
6a	Brush painted 4 additional coats	.11	.33	.66	.45	.31	.39	.45
7	Unpainted	.54	.87	.78	.73	.78	.75	.80
7a	Brush painted 6 coats	.56	.78	.70	.54	.53	.59	.65
8	Painted by manufacturer	.57	.71	.80	.56	.51	.52	.65
8a	Brush painted 4 coats	.58	.76	.51	.28	.25	.13	.45
9	Painted by manufacturer	.13	.40	.68	.63	.60	.68	.60
9a	Brush painted 5 additional coats	.20	.26	.31	.22	.18	.23	.25

Sample 3 is one of the incombustible materials of Type VI as described by Federal Specification SS-A-118. In this case the black stripes were again applied after the first coat of white paint. The four additional coats hid the black. Figure 4 shows the general appearance of this type of acoustic material. Figure 5 shows the surface appearance of this material magnified about 1⅞ times. Figure 6 shows how the surface appears after five coats of paint have been applied with a brush.

It will be noticed that the fine surface pores have been closed and there has been some loss of absorption at the higher frequencies. The larger openings, which give the fissured effect, are still open, and it would require a considerable number of additional coats of paint to close these openings. It is also of interest to note that the internal structure of this material is different from samples 1 and 2, and that there is not the large increase in absorption at 512 cycles.

Sample 4, as shown in figure 7, is representative of the material described as Type V in Federal Specification SS-A-118. Figure 8 shows the surface appearance of this material magnified about 1⅞ times and figure 9 the appearance after brush painting with four coats. The surface finish as received from the manufacturer was white, hence the black stripes were applied before the white coats of paint were applied.

Sample 5, as shown in figure 10, is a material which is classified as Type VIII in Federal Specification SS-A-118. This sample had what has been termed a "brushed" surface and is not typical of the materials grouped under Type VIII. Many of the materials have a sanded surface, and when paint is applied it films over much more easily than on the sample as shown as 5. Figure 11 shows the surface of this material magnified about 2½ times This material is made of wood fibers, as were samples 1 and 2, but of a much finer fiber; and when the fibers are felted together, the openings between the fibers are much smaller than for samples 1 and 2. Owing to the finer pores between the fibers, this material does not show an increase in absorption at 512 cycles when paint is applied. In fact, when it was brush painted with five coats, there was a decrease in absorption at this frequency; but at 128 cycles the absorption has been increased by the painting. It is also to be noticed that the brush painting increased the absorption at this frequency more than the spray painting.

Figures 12 and 13 have the same magnification as figure 11 and show the appearance of the surface of this type of material after it has been sprayed with seven coats and brush painted with five coats, respectively.

Table 2—Amount of paint applied per coat to test panels

Sample	Method of painting	Number of gallons of mixed paint used per 1000 sq ft applied for coat No.— 1	2	3	4	5	6	7	Number of coats required to hide black stripe
1a	Brush	6.9	5.2	4.3	3.5	3.5	....	....	5
2a	Brush	9.5	2.9	2.6	2.2	2.2	....	....	5
3a	Brush	8.7	3.5	3.0	2.6	2.6	....	....	4
4a	Brush	3.5	2.6	2.6	2.3	....	....	....	4
5a	Spray	4.3	3.5	3.9	4.0	4.0	4.8	6.1	....
5b	Brush	8.7	4.0	2.6	2.6	2.6	....	....	4
6a	Brush	2.6	2.6	2.3	2.3	....	....	....	4
7a	Brush	8.7	4.3	2.6	2.3	2.3	2.3	....	4
8a	Brush	3.5	3.5	3.5	2.9	....	....	....	4
9a	Brush	4.3	3.9	3.5	3.5	3.0	....	....	4

FIGURE 1 (above)—General appearance of samples 1 and 2.

It can be seen that the spray painting has left the surface of this material quite open and that there is only a slight decrease in absorption at the higher frequencies. The brush painting has closed up a large portion of the surface, and on the average there has been a considerable decrease in sound absorption. When the material which was photographed for these prints is examined it is noted that the spray painting gives a much better appearing material than does brush painting. In fact, this is true of all of the materials discussed in this paper except samples 3 and 6.

Sample 6, as shown in figure 14, is a material which has been classified as Type VI in Federal Specification SS-A-118. Figure 15 shows how this surface appears when it has been magnified about 1⅞ times. This material was painted by the manufacturer. Figure 16 shows the appearance of the surface after it has received four additional coats of paint. Judging from the previous samples, it would not be expected that the absorption of this material would be appreciably decreased by the added paint; but referring to table 1, it is found that there is an appreciable loss of absorption particularly at the higher frequencies. This is probably due to the fact that pores between the relatively large particles are not as intercommunicating as those in the previous samples.

Samples 7 and 8 are of an acoustic material which is applied with an air

FIGURE 2 (below, left) — Surface appearance of samples 1 and 2 when unpainted. (Magnified.)

FIGURE 3 (below, right) — Surface appearance of samples 1a and 2a when brush painted five coats. (Magnified.)

gun, and the surface appearance after painting is shown in figures 17 and 18. The magnification in this case is two-thirds. This material is of such a nature that it can be applied to give a number of different surface textures. Figure 17 shows what the manufacturer termed a "travertine" finish and figure 18 a smooth finish. Both these samples were applied directly on metal lath. For the unpainted sample the absorption must take place by all three methods discussed in the first part of this paper, as the material is porous, soft, so that it yields easily to the sound pressure, and relatively thin and light, so that it vibrates easily as a diaphragm.

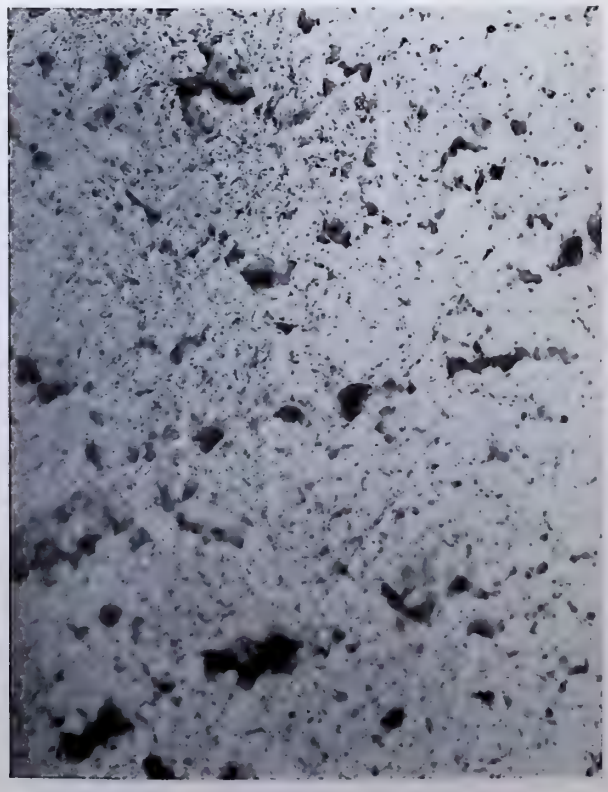
Sample 8a, which had been brush painted with four coats in addition to the paint applied by the manufacturer, had a paint film which was almost continuous, there being only an occasional opening about the size of a pinhead. This means that nearly all absorption by porosity was destroyed. Also, the paint film was so stiff that there was little yielding or vibration as a diaphragm at the higher frequencies, with the result that the absorption coefficients for these frequencies were quite small. At the lower frequencies this is not true, and the absorption has not been materially affected by the paint.

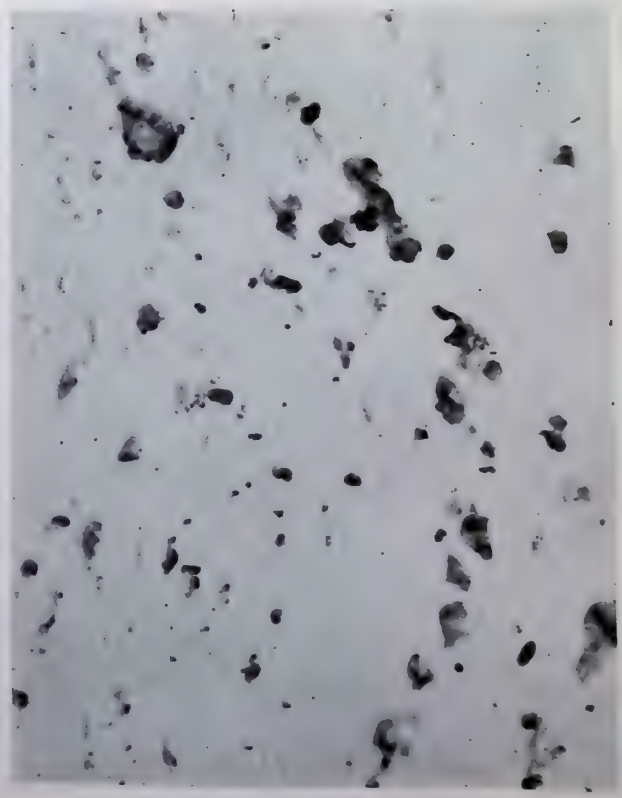
The principal difference between 7a and 8a is that the paint film is broken at many points on 7a. The surface of this sample was rough and had numer-

FIGURE 4 (above)—General appearance of sample 3.

FIGURE 5 (below, left)—Surface appearance of sample 3 when unpainted. (Magnified.)

FIGURE 6 (below, right) — Surface appearance of sample 3a when brush painted five coats. (Magnified.)





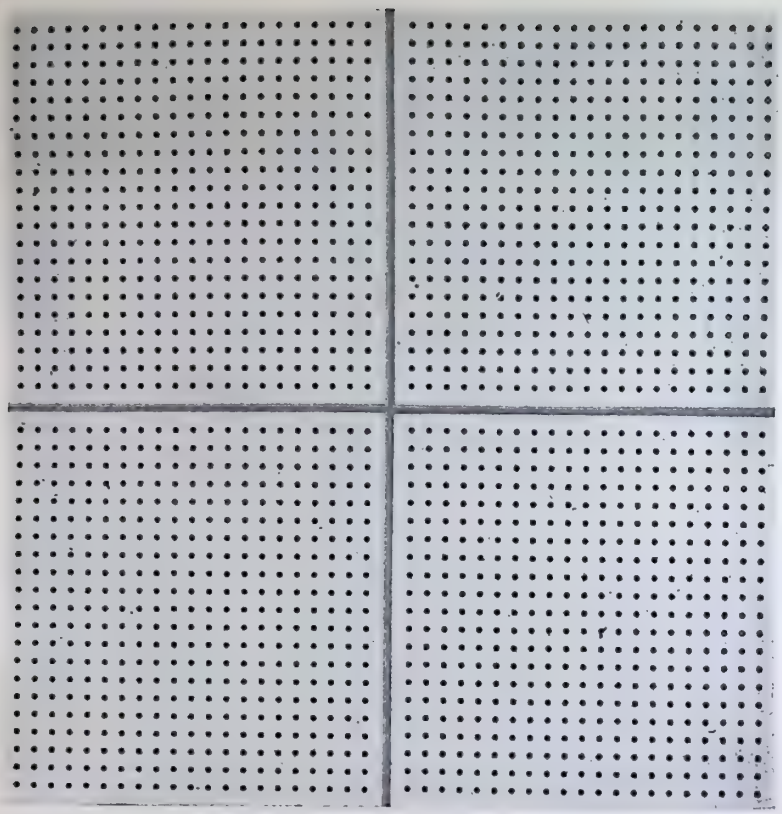


FIGURE 7 (above)—General appearance of sample 4.

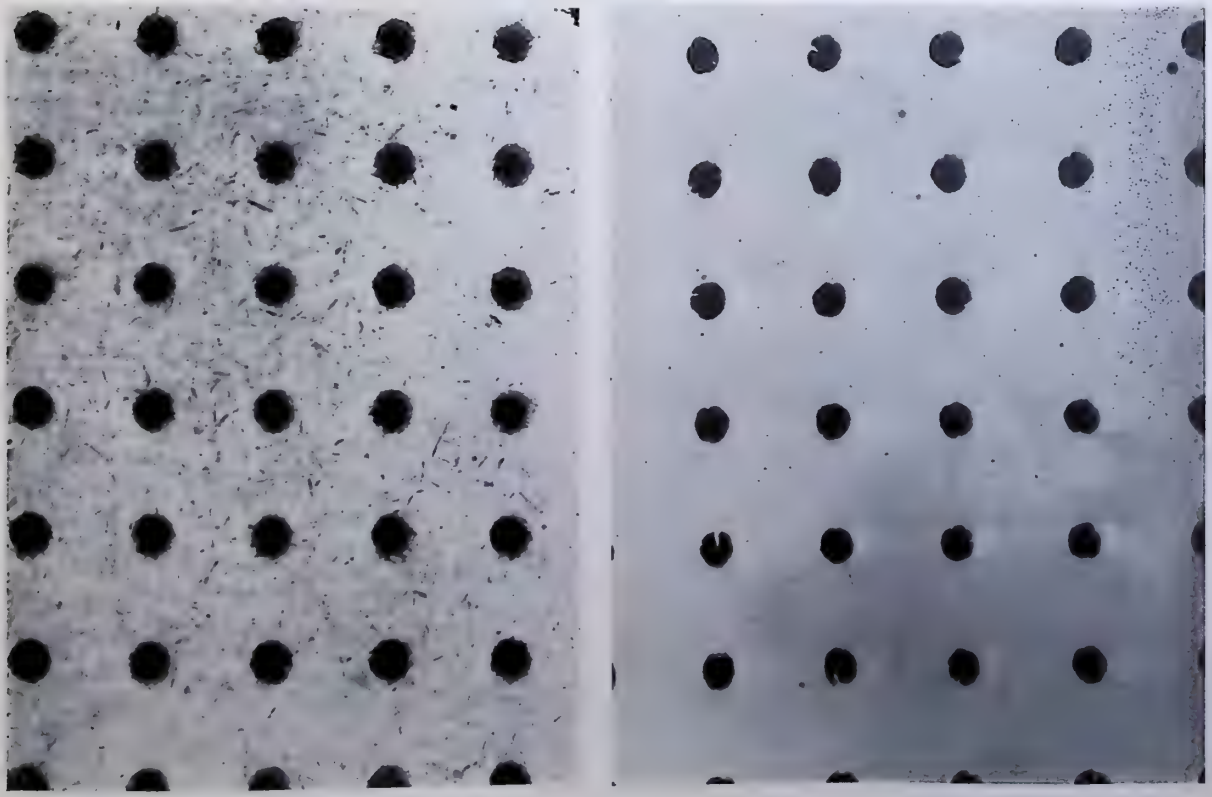
ous depressions, which prevented the painter from obtaining a continuous paint film when the paint was applied with a 3½-in. brush in the usual manner. As a result of these openings, a considerable amount of the sound energy was absorbed because of the porosity of the material, and there was not as much loss in absorption at the higher frequencies as there was for sample 8a.

Sample 9 is representative of Type II materials as described by Federal Specification SS-A-118. The surface texture is also similar to that of most of the acoustic plasters. The absorption of this type of material is largely due to the porosity of the material. Figure 19 shows the appearance of the surface after it has been magnified about 1⅞ times. It will be noted there are numerous small openings between the surface particles. Figure 20 shows the appearance of the surface after it has been brush painted with five coats. The small openings which could be seen before painting are now almost completely covered with a paint film. As shown in table 1, the absorption of this type of material is lost to a large extent as soon as sufficient paint is applied to form such a film.

It should be possible to paint this material more successfully with a spray gun, but considerable care should be taken not to apply too much paint in any one coat. After a few coats, however, such a material will film across with a resulting loss in absorption.

FIGURE 8 (below, left) — Surface appearance of sample 4 with R. I. finish. (Magnified.)

FIGURE 9 (below, right) — Surface appearance of sample 4a when brush painted four coats (Magnified.)



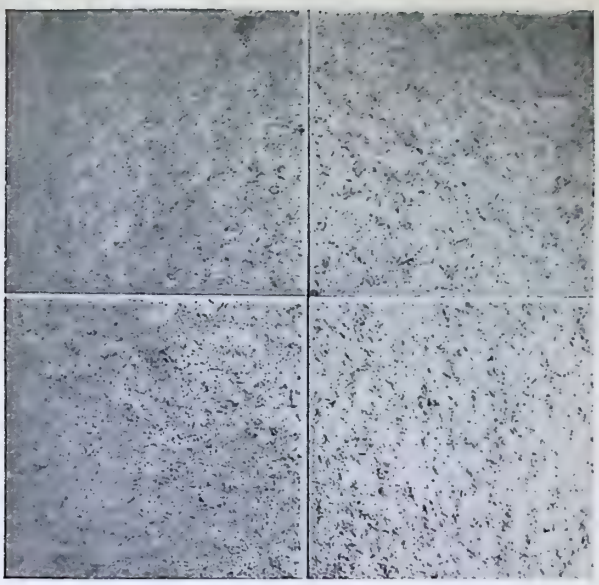


FIGURE 10—General appearance of sample 5.

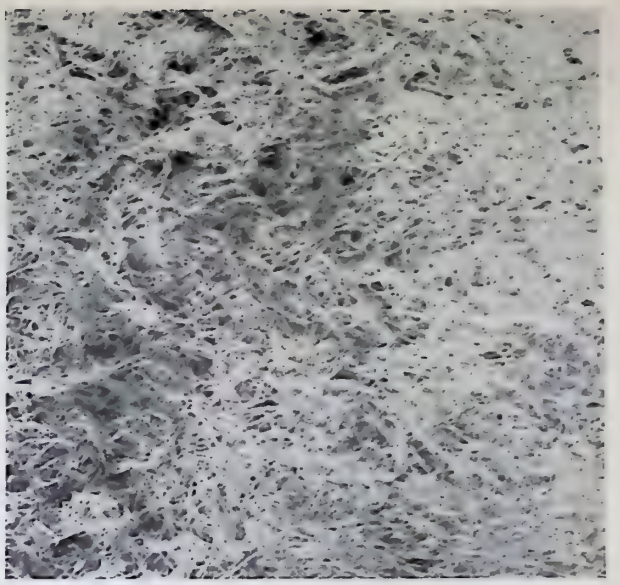


FIGURE 11—Surface appearance of sample 5 when unpainted. (Magnified.)

SUMMARY

The results given in this paper are not as complete as might be desired, but the materials on which results are given are quite representative of most of the acoustic materials which are on the market at the present time. Some of these materials can be painted with only one or two coats before there is a noticeable decrease in the sound absorption of the material, whereas other materials can be painted many times before the acoustic properties of the materials have been decreased. In practically all cases, however, considerable care must be taken as to how the paint is applied.

A comparison of the results given in

FIGURE 12—Surface appearance of sample 5a when spray painted seven coats. (Magnified.)

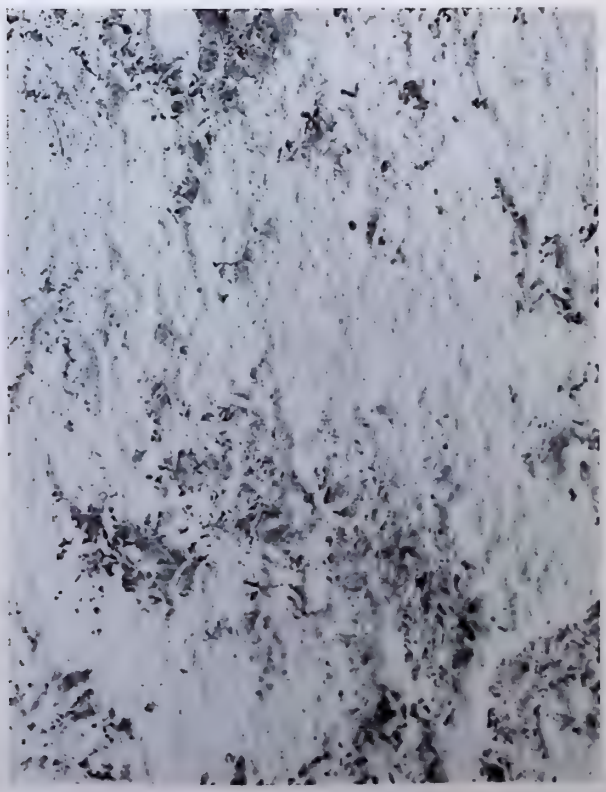


FIGURE 13—Surface appearance of sample 5b when brush painted five coats. (Magnified.)

FIGURE 14 (above)—General appearance of sample 6.

this paper with the results of various paint tests which have been published in the Bureau Letter Circulars on sound absorption coefficients issued during the past 10 years indicates that about the same results are obtained, whether the paint is a cold-water paint or an interior flat paint. In other words, if the paint is thinned to some extent before being applied and each coat is applied thin enough so as not to form a film across the surface, the principal factor which affects the decrease in absorption is the amount of pigment that is deposited on the surface. When a thin coat of paint is applied, most of this pigment is deposited on the top and sides of the surface particles or small projections on the surface of the acoustic materials. Additional coats continue to build up this amount of pigment. When the pore openings are very small, one or two coats may be sufficient to build this pigment deposit across the opening. When the pore openings are larger, more coats of paint are required before this deposit of pigment will close the opening.

The manner in which the paint is applied is also important, that is, whether the paint is applied with a brush or with a spray gun. It is possible to obtain a more uniform coating of the surface particles or projections when the paint is applied with a spray gun than when applied with a brush; likewise, more coats of paint are required before the pigment builds across the pore openings.

FIGURE 15 (below, left) — Surface appearance of sample 6 as painted by manufacturer. (Magnified.)

FIGURE 16 (below, right) — Surface appearance of sample 6a when brush painted four additional coats. (Magnified.)

FIGURE 17—Surface appearance of sample 7a when brush painted four additional coats. (Magnified.)

FIGURE 18—Surface appearance of sample 8a when brush painted five additional (Magnified.)

FIGURE 19—Surface appearance of sample 9. (Magnified.)

FIGURE 20—Surface appearance of sample 9a when brush painted five coats. (Magnified.)

An Acousti-Decorative Use for Fiberglas

An Artistic Sound-Proofing for Ceilings Uses Fiberglas Blankets, Cords, Fabrics

In numerous applications, Fiberglas in the wool-like forms used for thermal insulation has been employed for the control of sound as well as heat. During the war, it was installed as acoustical insulation in the control rooms of Navy ships, in aircraft, in bomber assembly plants, dynamometer rooms, sound stacks, and motor test stands. It was also employed to deaden sound in chambers used for the testing of communications equipment at Harvard University's Electro-Acoustic Laboratories and at the New York Navy Yard.

Harvard's chamber is a huge, windowless, concrete box the size of a four-story house, half buried in the ground. The thick walls enclose 72,000 cubic feet of the most anechoic (without echo) space on earth, for the sound waves that would otherwise be reflected from the walls, floors, or ceilings are absorbed by 20,000 Fiberglas wedges, 8 inches square at the base and 4 feet long, set to project in close array from all the interior surfaces of the chamber.

FIBERGLAS IN SOUND-PROOFING

These and other war uses of Fiberglas as an acoustical material laid the basis for its use to control sound in commercial and private aircraft, in auditoriums, theatres, restaurants, offices, motion picture, radio and television studios, factories and other types of commercial or industrial structures.

The Role of Fiberglas

Over-all sound control may require not only control of air-borne sound within an enclosed space, but exclusion of sound from the space, and the minimizing of sound at its source. The minimizing of sound at its source is not a function of Fiberglas sound-control materials except as Fiberglas may be used as lining for ducts or plenum chambers in air conditioning equipment, and the like to quiet machinery noise where such quieting can be accomplished by absorption of air-borne sound.

Except in aircraft applications, the exclusion of outside sound is a function of Fiberglas sound control materials to only a limited degree. In building construction of all types, exclusion of sound depends primarily upon the ability of walls, floors and ceilings to resist vibration. This, in turn, depends chiefly upon their weight and rigidity.

Efficient sound exclusion can be obtained only by great weight in single construction, or by the use of double construction. In double wall construction, the efficiency depends partly upon weight and rigidity, and to a large extent upon the degree of structural isolation between the two walls. Even a single nail driven through both sides of a double wall greatly reduces efficiency by conducting vibration across the air space. This also applies to floors and ceilings.

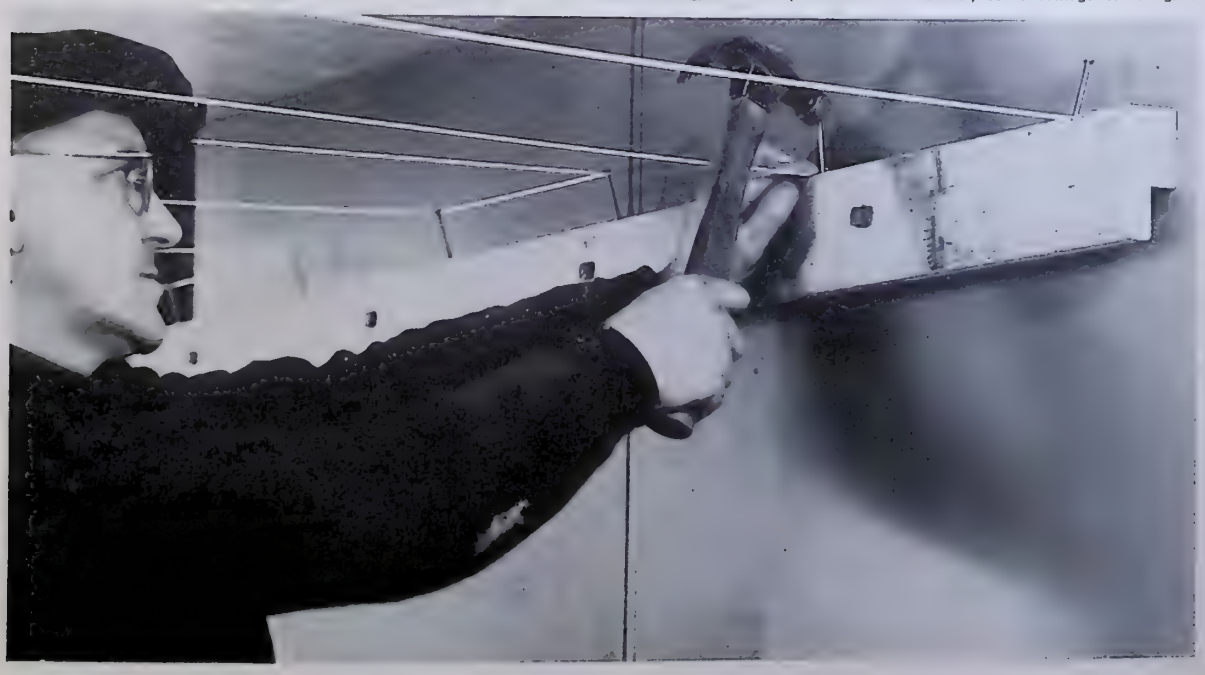
The volume of an enclosed space, and the reflecting or absorbing power of the surfaces, determines the length of time a sound originating within the space will be prolonged, the amount of sound overlapping, and, as a result, the hearing conditions within the space. The more reflective the surfaces, the longer a sound will reverberate; the more absorptive the surfaces, the shorter the time of reverberation.

The chief function of Fiberglas sound control materials in buildings of all types is the control of sound originating within an enclosed space, by absorbing the air-borne sound waves and preventing that prolongation and overlapping which results in a confused jumble.

Properties of the Materials

Use of Fiberglas sound control materials by the armed forces was based primarily upon their acoustical efficiency, but was also influenced to a large degree by their incombustibility, their non-moisture absorptive and rot-proof characteristics, and their light weight. Light weight may be of minor

FIGURE 1—A 2 by 4-inch fire-resistive-treated wood anchor rail (notched as shown in detail in Figure 6) is attached to the long sides of the room with its bottom surface at least 12 inches below the existing ceiling. (The virtual dead-air space between the final decorative fabric and the ceiling itself helps in the insulation properties of the system.) Fiberglas cord is then stretched across the room on nails inserted on 12-inch centers on top of the anchor rails. All wood or other normally combustible material should be especially treated with chemicals to make it fire-resisting, further to protect the inherent fire-proof advantage of Fiberglas.



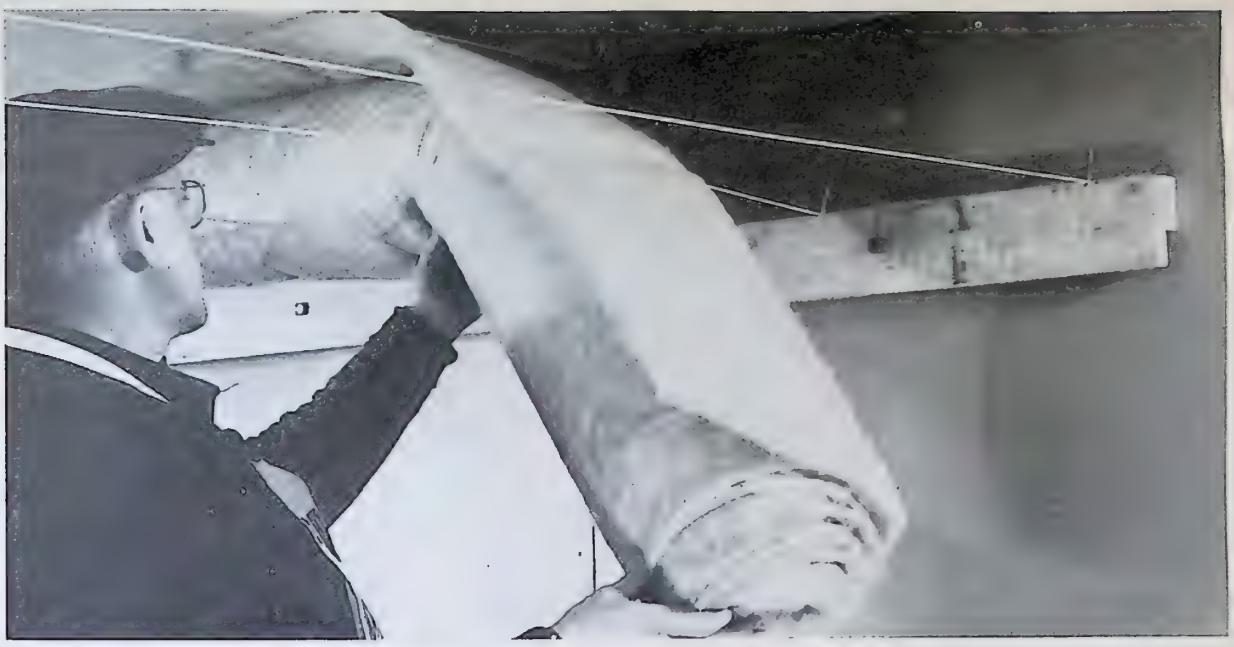


FIGURE 2—Rolls of Fiberglas insulation Type XAA-PF, or Type H-33—descriptions of which are to be found in the accompanying text—are laid on top of the Fiberglas cord and unrolled so as to cover the entire room area. The anchor rails, at least 12 inches below the existing ceiling, are dropped low enough to permit the easy placement of a standard roll of Fiberglas and allow ample room for the unrolling. The Fiberglas cord recommended in this system has a minimum breaking strength of 365 pounds, while the first type of Fiberglas blanket weighs only 0.025 pounds to the square foot, and the latter but 0.042 pounds to the square foot.

importance in some civilian applications, but the other properties are of prime importance in practically all applications. The fact that the materials combine high thermal insulating efficiency with high acoustical efficiency is also a major consideration.

In determining acoustical requirements of such spaces as auditoriums, it is common practice to consider reverberation at the one frequency of 512 vibrations per second. Spaces requiring critical analysis, in which the acoustical treatment must provide most of the sound absorption, may show excessive reverberation at low frequencies even though conditions may be satisfactory at 512 cycles. Because Fiberglas provides exceptionally high absorption at low frequencies it is particularly well suited for use in radio studios and other spaces requiring "straight line" absorption for good results.

Although efficient exclusion of low-

FIGURE 3—A standard width of Fiberglas cloth is then pleated and stapled at both ends to a ¾ by ¾-inch fire-resistive-treated wood nailing strip. The pleats may be as wide as desired, but they should be designed so as to utilize the standard width of cloth and to form a desirable planned spacing pattern across the room. In the completed installation shown in Figure 7, the pleats are 3 inches wide on 6-inch centers. The Fiberglas cloths recommended as a decorative finish are strong, relatively thin fabrics woven from Fiberglas yarn. Fiberglas fabrics are listed by the Underwriters' Laboratories, Inc., as "Non-combustible Fabric."

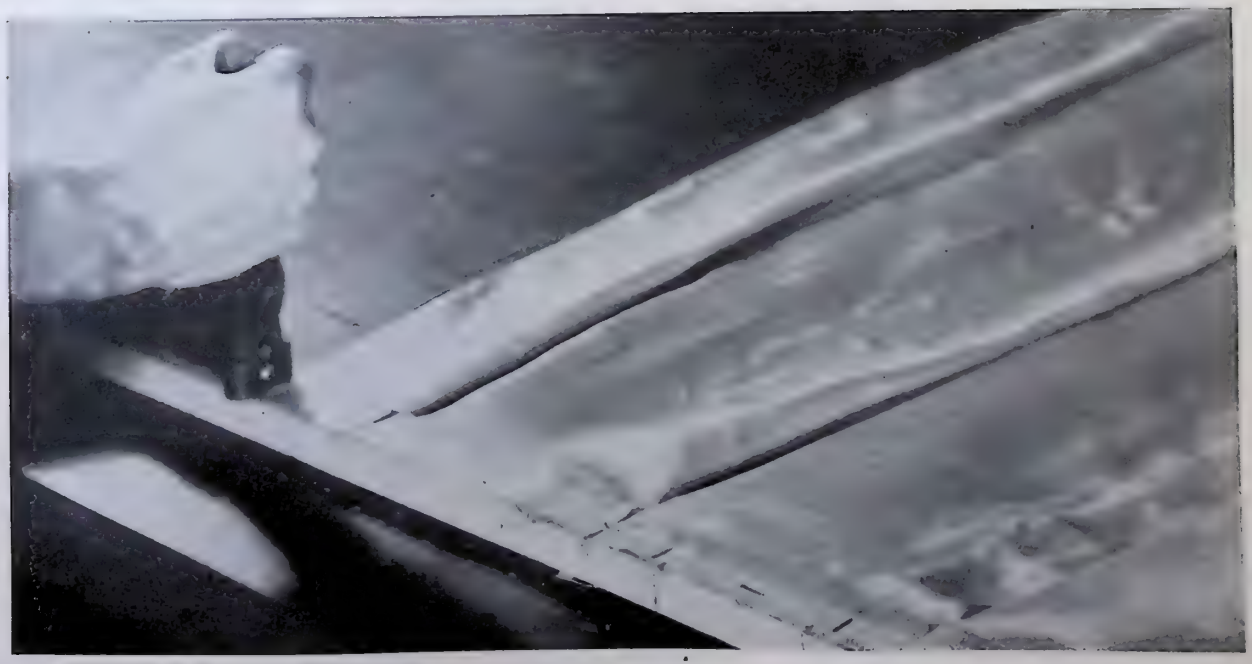


FIGURE 4—The nailing strip, with the pleated cloth attached, is then inserted in the notch of the anchor rail on both sides of the room, and the cloth is pulled taut by adjustment screws. The cloth will not shrink or stretch and, therefore, should require little tightening. As can be seen, the system can be installed under all conventional types of ceilings with very little preparation or additional materials, and application methods are considered applicable to offices and small rooms. All of the Fiberglas materials employed in the system—the cords, insulation blankets, fabrics—are non-combustible, dimensionally stable, and light in weight.

frequency sounds is not possible without weight and rigidity in construction, Fiberglas blankets are a highly efficient sound excluding material for aircraft applications, where sound frequencies range from about 2500 to 10,000 cycles a second, and average 5000 cycles a second.

Acoustical materials employed to control sound originating within an enclosed space are tested in a reverberation chamber under conditions similar to those of their actual use. Resulting data rate the materials in terms of a coefficient, or percentage, of absorption as compared with 100 per cent absorption.

Acoustical materials are rated by comparing sound transmission through the blanket with sound transmission through an equal weight added to the dural skin of the plane.

An efficient acoustical blanket provides a value which is known as the "decibel-better-than-weight-law" value.

FIGURE 5—This last added detail shows the completed application. Any type of bed or finish molding can be used to conceal the anchor rail and cloth nailing strip. The molding, of course, should carry around the room. The result, as further set forth in Figure 7, is both decorative and acoustically efficient. Several application methods are, of course, possible, but the one shown here in detail had been used and found the most successful for rooms with short ceiling spans. Where ceiling spans may exceed 16 feet, intermediate supports are required. Designers may plan framing members suspended from the celing or incorporate supports.

In other words, a value far in excess of the value which might be predicted on the basis of the weight of the blanket.

This value, divided by the weight of a finished blanket (known as treatment weight), gives a merit factor which is used as a basis for comparing performance of acoustical blankets in various applications. Results of representative tests of Fiberglas aircraft blankets, composed of glass fibers with an average diameter of five one-hundred-thousandths (0.00005) of an inch (are as follows:

Specimen weight (pounds to the square inch)	0.0504 lb.
Total treatment weight (pounds to square foot)	0.1464 lb.
Decibels-better-than-weight law	27.2 db.
Merit factor	186
Average attenuation	71.0 db.

The blankets tested consisted of two ½-inch layers of fibers with an asbestos septum between the layers. The blankets were faced on one side with trim cloth.

Sound Absorption Theory

Just how a material absorbs sound is still not fully understood, but it has been stated that friction of the pulsating air molecules against the interstices of porous materials transforms sound energy into heat, and that it is in this way that most sound absorption is provided. If this theory is correct it follows that, within limitations, by increasing the total surface area provided by a material, the noise absorption value can be increased.

Total surface area of a porous fibrous material can be increased by decreasing the diameter of the fibers that make up the material. Further research may demonstrate that acoustical values are functions of fiber diameter, and of the surface area of the fibers. This theory would account for the performance of Fiberglas as an acoustical material. A pound of glass fibers with an average diameter of 5 one-hundred-thousandths (0.00005) of an inch has 36,000 times the surface area of the same amount of glass in the form of a sphere.

FIBERGLAS ACOUSTICAL SYSTEMS

The Fiberglas non-combustible, fabric-faced acoustical system is a combination of Fiberglas acoustical insulation and Fiberglas fabric so arranged as to provide a practical method of treating a ceiling for noise reduction and interior decoration.

The system can be installed under all conventional-type ceilings with very little preparation or additional materials required. The material and application methods are considered applicable to offices and small rooms.

Types of Combinations

Two combinations have been developed in the Fiberglas system.

Combination No. 1 consists of Fiberglas insulation, Type XAA-PF, suspended on Fiberglas treated cord, Type EC5-8T, above a finish of Fiberglas continuous-filament, plain or decorative fabric.

Combination No. 2 is identical with No. 1, except that Fiberglas insulation, Type H-33, is employed as the principal acoustical material.

All Fiberglas materials employed in the system are non-combustible, dimensionally stable, light in weight, and easy to handle.

Description of Products

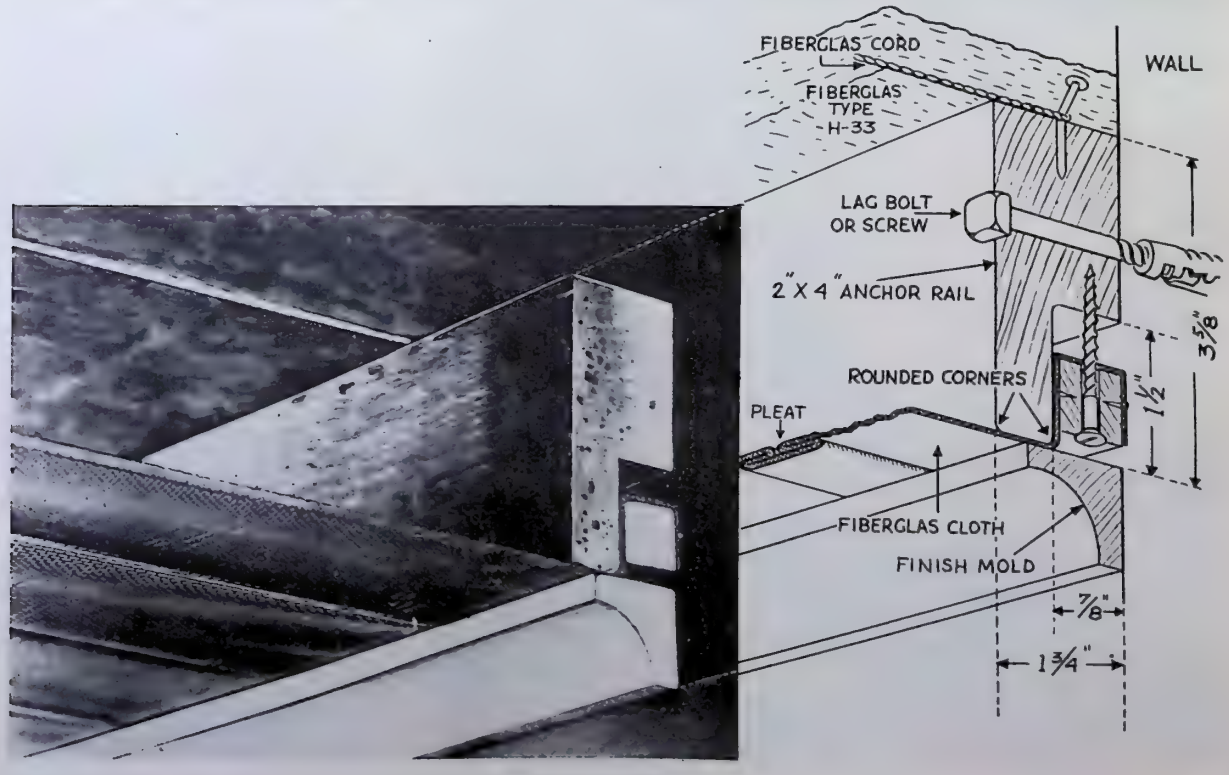
Fiberglas insulation, Type XAA-PF, is a soft, resilient blanket, supplied in ½-inch thickness and at a density of 0.6 pound to the cubic foot and weighing approximatcly 0.025 pounds to the square foot.

Fiberglas insulation, Type H-33, is similar to Type XAA-PF, but supplied in 1-inch thickness and at a density of 1 pound to the cubic foot, and weighing approximately 0.042 pound to the square foot.

Fiberglas cord, Type EC5-8T, is a continuous-filament, treated cord, having a minimum breaking strength of 365 pounds, excellent moisture resistance, and will not shrink or stretch.

The Fiberglas cloths recommended as a decorative finish for the system are strong, relatively thin fabrics, woven from Fiberglas yarns. Fiberglas fabrics are listed by the Underwriters' Labora-

FIGURE 6—Construction details are shown here. The application of the Fiberglas non-combustible, fabric-faced acoustical system—and particularly of the fabric—should be done by mechanics experienced or properly trained in the use of Fiberglas for decorative purposes. The system is designed to permit taking down and cleaning of the fabric when necessary. Cleaning should be done in accordance with accepted practice for the particular type of Fiberglas fabric used. Because of the excellent acoustic characteristics of both the Fiberglas insulation types, results indicate a noise reduction comparable to the best available acoustic treatment.



tories, Inc., as non-combustible fabric.

Such fabrics are available in thicknesses from 0.007 to 0.015 inch and in several different weaves. Selection of the individual fabric is dependent upon the properties and appearance desired.

The Fiberglas blanket, cord, and fabric are completely incombustible. All wood is treated for fire resistance. The fabric can be vacuum-cleaned, or superficial dirt can be wiped off with a damp cloth. If necessary, the fabric can be taken down, dry-cleaned, and re-installed.

Method of Application

Several application methods are possible, but the one shown in detail on these pages has proved most successful to date for rooms with short ceiling spans. For restaurants, night clubs, and other places of public assembly, where ceiling spans may exceed 16 feet, intermediate supports are required. Designers may plan framing members, suspended from the ceiling or incorporate supporting devices within the system itself.

A 2 x 4-inch, fire-resistive-treated wood anchor rail, notched as shown in Figure 1, is attached to the long sides of the room with its bottom surface at least 12 inches below the existing ceiling. Fiberglas cord is then stretched across the room on nails inserted on 12-inch centers on the top of the anchor rails. (Figure 2.)

Rolls of Fiberglas insulation, Type XXA-PF or Type H-33, are laid on top of the Fiberglas cord, and unrolled so as to cover the entire room area. (Figure 3.) The anchor rail is dropped low enough below the existing ceiling to permit easy use of a standard roll of material.

FIGURE 7—The offices of the John Hand and Sons, Inc., were treated in the described manner, one of these being shown here. Here also the window draperies are of Fiberglas. It should be noted that here the sprinkler heads have been inverted and lowered to project through the Fiberglas fabric. Wood frames are installed from which to hang the lighting fixtures. The fabrics can be vacuumed or dry cleaned. Superficial dirt can be wiped off easily.

The load the Fiberglas sound-absorbing blanket imposes on the Fiberglas cord is so small as to be negligible. Because the glass fibers will not absorb water, the Fiberglas cord is not affected by humidity changes. There is, therefore, nothing to cause the cord to shrink or to stretch or sag. This also holds true for the fabric.

A standard width of Fiberglas cloth is then pleated and stapled at both ends to a ¾ x ¾-inch, fire-resistive-treated wood nailing strip. (Figure 4.) The pleats may be as wide as desired, but should be designed so as to utilize the standard width of the cloth and to form a desirable planned spacing pattern across the room. In the completed installation shown in Figure 7, the pleats are 3 inches wide, on 6-inch centers.

The nailing strip, with cloth attached, is then inserted in the notch of the anchor rail on both sides of the room, and the cloth is pulled taut by adjustment screws. (Figure 5.) The cloth will not shrink or stretch and, therefore, should require little or no subsequent tightening.

The detail shown in Figure 6 is of the complete application. Any type of bed or finish mold can be used to conceal the anchor rail and cloth nailing strip. This mold should carry around the room. The result is both decorative and acoustically efficient.

The application of the system, and particularly of the fabric, should be done by mechanics experienced or properly trained in the use of Fiberglas fabrics for decorative purposes.

The system is designed to permit taking down for cleaning of the fabric when necessary. Cleaning sould be done in accordance with accepted practice for the particular type of Fiberglas fabric used.

Acoustical Value

The excellent acoustical characteristics of both Fiberglas insulation, Type XAA-PF and Type H-33, are well established, and preliminary tests indicate that Fiberglas non-combustible, fabric-faced acoustical system has a noise-reduction coefficient comparable to the best available acoustical treatment. In fact, the cloth itself provides useful acoustical absorption.

A Typical Installation

One of the first presentations of this method of installing fire-safe Fiberglas materials in the treatment of ceilings, to achieve sound reduction and a decorative effect, was in the offices of John Hand and Sons, Inc., in New York.

Here (Figure 7) the ceilings are of conventional concrete and plaster construction—with through beams and exposed pipes and conduits—of the type found in many large office and loft buildings. Fiberglas materials employed are considered applicable to various types of ceiling construction, and to the ceilings of theatres, restaurants, hotels, night clubs, and other places of public assembly.

In preparing ceilings similar to those in the Hand offices for the installation of the Fiberglas materials, sprinkler heads are lowered and wood frames are installed from which to hang the light-containing metal boxes.

Design and Equipment for Cinema Stages

Some Generalizations on the Construction And Operating Equipment for Various Uses

C. E. Tompkins
President, J. R. Clancy, Inc.

For a detailed drawing of all the various parts of the modern theatre stage, and for the proper location for the various items of equipment mentioned in the article, the reader should turn to the fold-out included within these pages.

Stage construction does not lend itself to standardization and there is no stock plan that will serve all types of stages. Theatres are usually built in the downtown districts and sandwiched in between other buildings. This creates problems of where to locate entrances to the stage, loading docks and fire escapes.

STAGE CONSTRUCTION

The width of the auditorium and its planned seating capacity dictates to a large extent the width of the proscenium opening. Where the theatre has a balcony, this has a direct bearing on the height of the proscenium opening. The height of the proscenium opening, in turn, has a direct bearing on the height of the gridiron or fly space over the stage. Therefore, it is necessary to work out a plan for each individual stage that will meet in the best possible manner all of these problems.

It is not the purpose of this article to offer a plan for a stage that will fit every theatre but, rather, to provide a general plan which may be contracted or expanded to meet conditions.

During the big vaudeville era, a theatre was required to handle many different types of acts, with dramas, etc. during the Summer Stock season, and perhaps a few operas sandwiched in. This required a stage so flexible that all of these different types of entertainment could be properly served. Since most of the traveling troupes carried considerable equipment, such as curtains, flats, etc., it was also necessary that a stage be so constructed that a complete show could be hung in a comparatively short time—perhaps two hours—and dismantled just as readily. It naturally follows that with years of experience in this phase of the show business all of the so-called "bugs" were eliminated and a very workable type of stage developed which successfully met all of these demands. This type of stage may be equipped with as few as twenty sets or may be extended into sixty or seventy.

Proscenium Opening

Generally speaking, the proscenium opening should be as wide as necessary to give clear vision from the side seats, but where no other provision can be made for offstage space it is sometimes necessary to sacrifice a few seats up front and on the extreme sides in order to reduce the proscenium opening to a point where ample space for operation can be provided on each side.

The height of the proscenium opening is closely related to the slope of the auditorium floor and balconies and galleries, if any, or, in short, the elevation of the projection room portholes. Having established the position of the picture screen on stage and its height, projection lines can be readily struck off to the projection room portholes. The height of the proscenium opening should be at least 2½ feet above this line where it passes through the proscenium opening.

Operating Equipment

The counterweights, or operating equipment, may be placed on either side of the stage, and this is usually influenced by the location of the loading dock, which should be on the opposite side of the stage from the counterweight sets or operating equipment. The side of the stage selected for the operating equipment automatically becomes the "prompt" side. Practically all of the backstage operation, including prompting, takes place on this side, which leaves the other side fairly clear for the storage or props, trunks, etc. Thus, the loading dock should be more accessible to the opposite or "off prompt" side. It is also necessary that the "prompt" side provide space for the control board.

Stage Plan

In the plan drawing we have endeavored to depict this type of stage and to show what is frequently termed a "skeleton stage" in that it provides only the essential equipment for proper masking, lighting, and so forth, with a minimum of extra sets.

Valance—This piece of equipment is shown hanging in front of the asbestos curtain although it is many times placed in the rear. Where the valance is located in front of the asbestos curtain it is only necessary to raise the asbestos curtain high enough to mask behind the valance. On the other hand, if the asbestos curtain flies in front of the valance it must be raised high enough to clear the proscenium arch. Since the asbestos curtain in reality governs the height of the gridiron and roof, this phase of the work is extremely important and will be discussed later on in this article.

The valance, when used in front of the asbestos curtain, flies in the smoke pockets with the asbestos curtain and can be trimmed to any desired height. A beautiful valance enhances the proscenium opening.

The one exception to the foregoing is where a contour curtain is used, in which case the asbestos curtain must always clear the proscenium opening when in "up" position.

It is always necessary to flameproof the valance material and in some cities there is strong objection to placing anything in front of the asbestos curtain, but, generally, this is permissable where a good fireproofing job is done.

Asbestos Curtain—The asbestos curtain is constructed of not less than 80 per cent pure asbestos, which material lends itself very well to painting and practically any design can be painted on the asbestos curtain. Fire regulations decree that the operating set for the asbestos curtain be separated from the regular counterweight system and that the curtain be so rigged with a fusible link system that in case of fire and the melting of one or more links the curtain will descend without assistance. This refers to the flexible type of asbestos curtain generally used on stages under 60 feet in width.

Steel-frame asbestos curtains are constructed by building a steel frame that will withstand a wind pressure of 10 pounds to the square foot over the exposed area of the curtain and both sides are covered with asbestos cloth. The requirements as to fusible link system, and so forth, are the same on both types of curtains.

Proscenium Curtain—Where the stage is to be used as a combination stage and where pictures play a prominent part in the show, it is desirable to have a proscenium draw curtain. This piece of equipment hangs immediately back of the asbestos curtain and should be of the same material as the Valance and a color that should harmonize with the interior of the auditorium.

Concert Border Light—This border light is intended to light the space in front of the main act curtain or, in other words, the first entrance. The circuits are wired alternately in whatever colors are selected—usually red, blue and white. The light should be as long as the proscenium opening is wide and the cables connected to the switchboard and dimmers.

The concert border light, with the aid of a few balcony spots, should furnish all of the light required for the front of the stage.

On many of the larger stages a light bridge is used, in which case the concert border light is hung underneath the light bridge and the spotlight equipment operated from the bridge above the concert border light. This is a very desirable piece of equipment and very much facilitates lighting.

Grand Drape—Probably no piece of equipment on the stage, with the excep-

tion of the main-act curtain, is used to better advantage or more frequently than the grand drape. It should be much higher than any of the rest of the borders to permit trimming for low acts, trimming of picture screen, and so forth. The grand drape in connection with the tormentors provide the front setting for the deep stage.

Tormentors—The two side curtains, sometimes referred to as "legs," which in connection with the grand drape mask the stage at this point.

Main Act Curtain—The main act curtain is generally located 4 to 5 feet back of the proscenium arch and, of course, is used more than any other piece of equipment on the stage because of the many purposes it serves. When closed it acts as a speaker curtain or a background for the first entrance. When open it exposes the main part of the stage and it serves to mask the picture screen. Also it can be opened and closed for encores and the like.

The main act curtain should always be placed on a draw curtain track which, in turn, should be hung from a counterweight set.

Extra Set—It is always advisable to provide an extra set just back of the main act curtain, which set serves many utility purposes.

Picture Screen.

Sound Horn Set—Sometimes these two sets are combined but this is not considered good practice as it places too much load on one set.

Ceiling Border—For masking purposes only.

Mid-Stage Close-Off Curtain—Usually on a track and provides means for closing off the stage at this point when the whole stage is not required.

Intermediate Border Light—Practically the same as the concert border light though usually of greater capacity.

Ceiling Border—For masking purposes only.

Side Legs.—For masking purposes only.

Extra Sets.

Cyclorama Border Light—A standard border light of sufficient capacity may be used for this purpose but the preference seems to be for a battery of hanging floodlights attached to the counterweight batten in place of the standard border light. The cost being about the same, it is a matter of preference, which seems to be in favor of the hanging floodlights.

Extra Sets.

Cyclorama Border.

Cyclorama—These two pieces of equipment furnish the background for the stage.

Floor plugs wired for three circuits and connected to dimmers should be located on both sides of the stage at entrances two, three, and four.

Spotlight trees (inexpensive equipment) should be provided at entrances two, three and four and spotlights provided for these trees, such lights to be wired in color and connected to dimmer board. This makes it possible to take out all shadows and highlight any part of the stage, and reduces the amount of overhead lighting necessary.

The exception to this is where a light bridge is used, in which case the extra lighting is done from the bridge and, therefore, spotlight trees are not necessary.

It will be noted that on this type of stage all entrances are clear for moving props to or from the stage, or for talent to enter and leave the stage. Another, and very good reason, is that this provides to some extent cross-stage ventilation and also leaves the sides of the stage open for the director and electrician to see all parts of the stage.

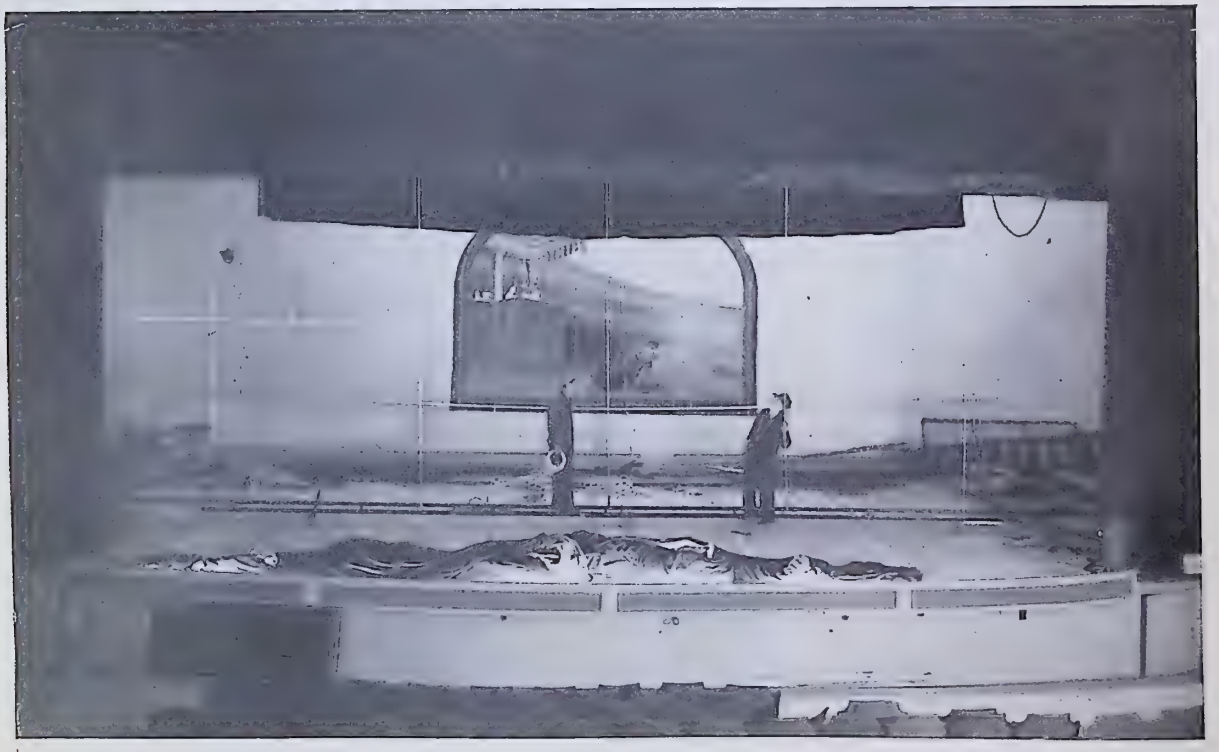
Control Boards

In order to provide proper space and accessibility for the control board, it is first necessary to determine the size board required, which is governed by the number of circuits that are to be handled from the board, which, of course, includes the auditorium lighting as well as the stage lighting. The most practical method of providing a location for the control board is a recess in the proscenium wall sufficiently large to take the board, and in the drawing the board is shown in such a recess and provision has been made for access to the rear of the board for maintenance.

Gridiron

The construction of a practical gridiron and the development of the proper

STAGES FOR MOTION-PICTURE THEATRES need not be either large or as well equipped as a Broadway legitimate theatre, but all theatres should have them, for they open up avenues of additional revenue and further community service denied the theatre not so endowed. While stages, well equipped for the particular theatre, should be in the house's original plan, they can be added with surprisingly little effort. Regardless of the size of the stage, it should be equipped in such a way that the theatre's management may make best use of all the available space. An expert in stage design should always be consulted for best results in the long run.



height seems to be one of the major problems. Under the heading of "Valance" we have made reference to the height of the asbestos curtain and its relation to the height of the gridiron. All fire codes require the asbestos curtain to lap the proscenium opening on each side by 1-foot and at the top by

over the full depth of the stage.

The height or clearance from the top of the gridiron to the underside of the roof need not be over 5½ feet or 6 feet, which will provide sufficient clearance underneath the roof trusses regardless of the depth of such trusses. In other words, the point made here is that head

basement but where they are placed in the basement or on a balcony it is always advisable to check with the city fire regulations and determine if required fire escape accommodations can be provided. Washrooms and toilets are also necessary.

The dressing room table should not be more than 20 inches wide and extending

tion of the main-act curtain, is used to better advantage or more frequently than the grand drape. It should be much higher than any of the rest of the borders to permit trimming for low acts, trimming of picture screen, and so forth. The grand drape in connection with the tormentors provide the front setting for the deep stage.

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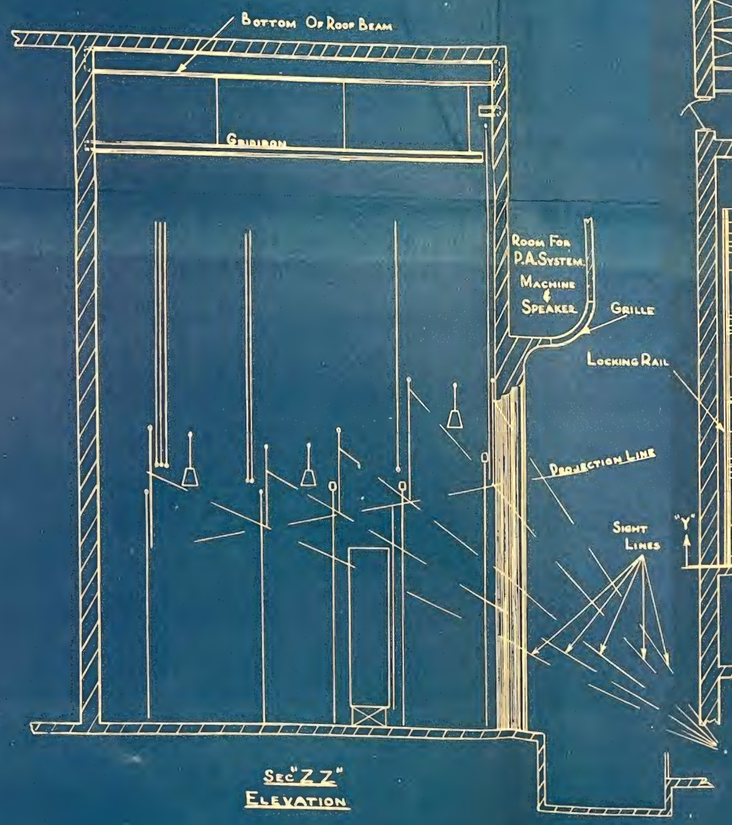

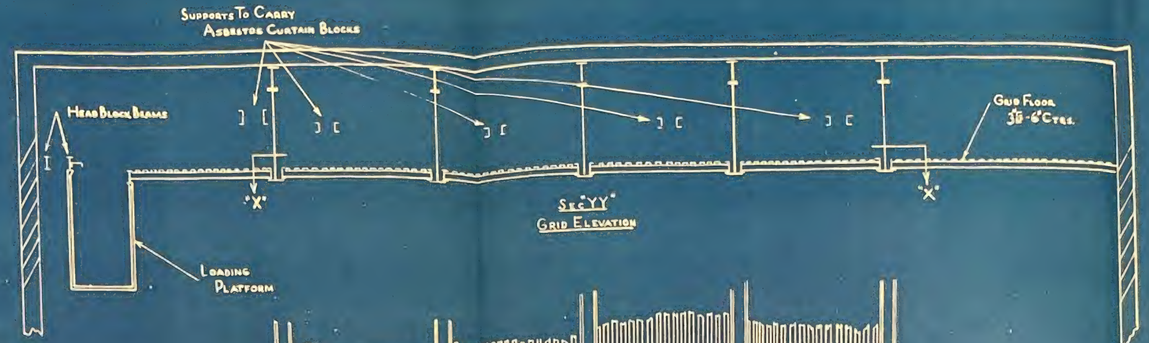

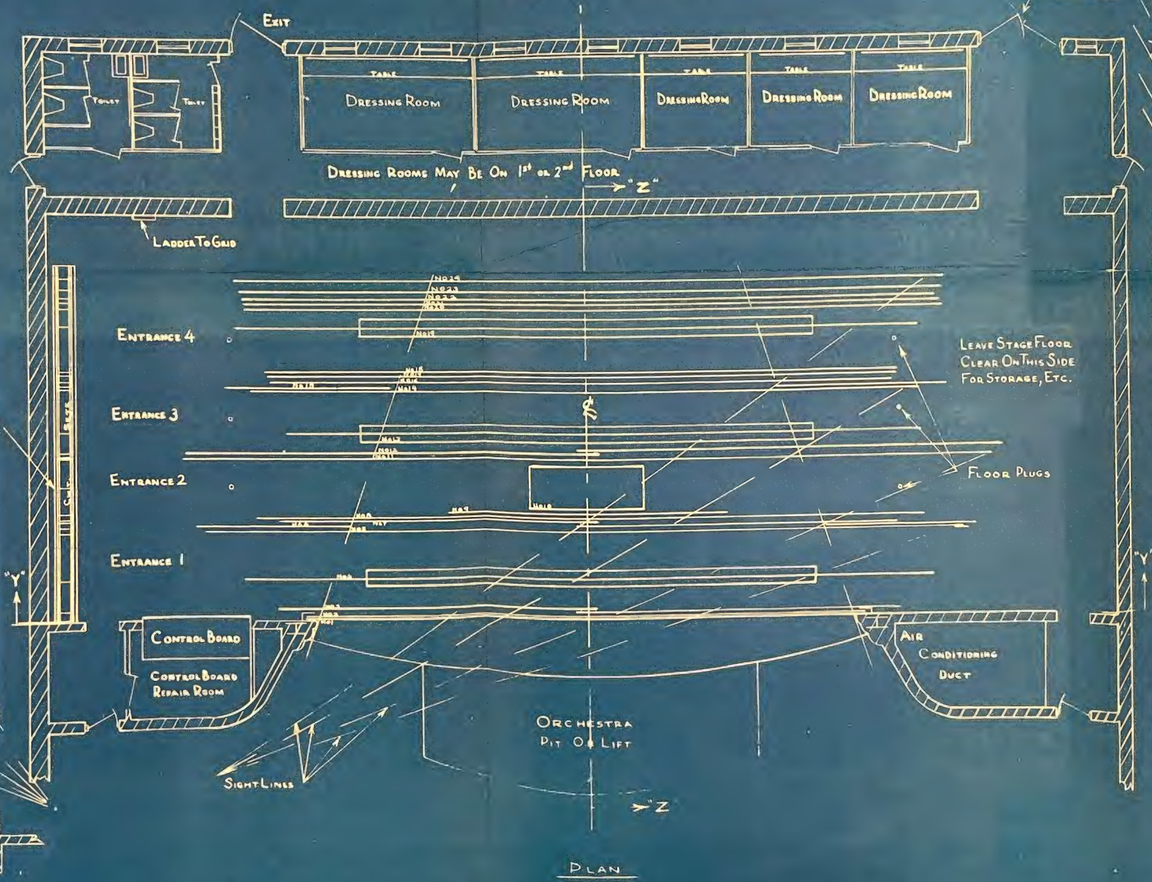

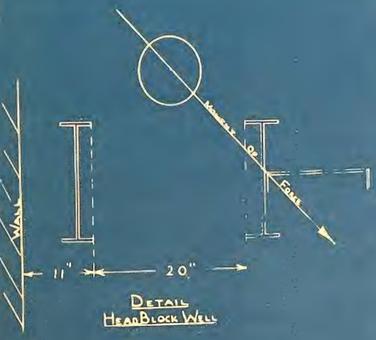

No	Cwt. Sets
1	Valance
2	Asbestos Curtain
3	Proscenium Curtain
4	Concert Border Lights
5	Grand Drape
6	Tormentors
7	Main Act. Curtain
8	Extra Set
9	Picture Screen
10	Sound Horns
11	Ceiling Border
12	Close Off Curtain
13	Inter. Border Lights
14	Ceiling Border
15	Side Legs
16	Extra Set
17	" "
18	"
19	Cyclorama Border Lights
20	Extra Set
21	
22	
23	Cyclorama Border
24	Cyclorama Curtain

RECOMMENDED PLANS for a MODERN STAGE

tion of the main-act curtain, is used to better advantage or more frequently than the grand drape. It should be much higher than any of the rest of the borders to permit trimming for low acts, trimming of picture screen, and so forth. The grand drape in connection with the tormentors provide the front setting for the deep stage.

Ceiling Border—For masking purposes only.

Mid-Stage Close-Off Curtain—Usually on a track and provides means for closing off the stage at this point when the whole stage is not required.

Intermediate Border Light—Practically the same as the concert border light

wired in color and connected to dimmer board. This makes it possible to take out all shadows and highlight any part of the stage, and reduces the amount of overhead lighting necessary.

The exception to this is where a light bridge is used, in which case the extra lighting is done from the bridge and

height seems to be one of the major problems. Under the heading of "Valance" we have made reference to the height of the asbestos curtain and its relation to the height of the gridiron. All fire codes require the asbestos curtain to lap the proscenium opening on each side by 1 foot and at the top by 18 inches, and some codes require 24 inches. The lap at the sides may include the flashing on the proscenium opening provided the smoke pockets can be anchored to the column and not to the flashing and still properly lap the asbestos curtain.

Assuming that we have a proscenium opening of 25 feet in height from the stage floor to the bottom of the flashing (if any) the over-all height of the curtain would obviously have to be 26 feet 6 inches. In order to clear the proscenium opening it would require a clear fly space of 53 feet from the floor to the bottom of the gridiron plus at least 6 inches for cable clips and fasteners.

None of the other sets on the stage requires as much head room as the asbestos curtain. Since it is of major importance in most buildings to keep the gridiron and roof as low as possible due to cost, it is desirable to construct the gridiron as shown in Section X-X. This gridiron features a slot which permits the asbestos curtain to pass upward through the slot. Thus we are able to utilize the space above the gridiron and below the roof to take care of the extra height required by the asbestos curtain. In order to accomplish this, short stubs of lightweight channels can be inserted in the proscenium wall when the building is being built or blocks can be attached to the proscenium wall at a later date. In order to determine the correct length of this slot it is necessary to predetermine the length of the asbestos curtain and allow for sufficient clearance at each end of the slot.

When the slotted type of gridiron is used in conjunction with the valance flying in front of the asbestos curtain, it is obvious that a very material reduction in the height of the stagehouse can be made, and in many cases the height of the roof over the stage can actually be held down to the level of the auditorium roof.

On the larger stage having considerable depth, the problem of gridiron construction is one that requires considerable thought. If the gridiron is to be carried entirely by spanning the distance from the proscenium wall to the back wall of the stage, it is obvious that the beams will have to be heavy and of considerable depth. This, of course, adds another foot or so to the height of the building, and obviously the more steel placed in the gridiron the greater the load to be supported by the columns and footings.

Most stages have rather sizable roof trusses. By increasing the size of the roof trusses and supporting the center of the gridiron carrying beams by hangers from the roof trusses, and supporting the ends of the gridiron by wall bearings, the total weight of the gridiron can be reduced materially, frequently more than half. It will be found more economical to construct the gridiron along these lines than to attempt to provide a clear span over the full depth of the stage.

The height or clearance from the top of the gridiron to the underside of the roof need not be over 5½ feet or 6 feet, which will provide sufficient clearance underneath the roof trusses regardless of the depth of such trusses. In other words, the point made here is that head clearance is not required under the roof trusses. If a job is properly designed and properly installed there is little work to be done on the gridiron after installation. Since the equipment rests on the gridiron, a man in working position is usually kneeling and the matter of head clearance is not too important. Where a set comes directly underneath the trusses he can work from either side.

By this time it should be evident that keeping down the height of the building is of paramount importance from the standpoint of cost, and in many cases, such as civic auditoriums without adjacent buildings, the architect is enabled to carry a level roof line over the entire building which means a general reduction in height.

Headlock Beams

The headblock beams are required to carry the total load of the stage equipment and thus they must be of heavy construction. Since it is not practical to provide a roof truss over the top of these beams from which to give them additional support, it is quite necessary that they be of sufficient capacity to carry this load on a clear span. The top of these beams should be elevated at least 1 foot, and preferably 18 inches, above the level of the loft block wells to provide proper fall for the cables. Any clearance between the top of these beams and the roof of 2¼ feet or greater is sufficient.

Since headblock beams carry the total load of the stage equipment, and since the moment of force comes at an angle of approximately 45 degrees, it is necessary to provide a bracer beam where the span is of considerable length to provide against buckling. Furthermore, at one or more points in the span the "on stage" beam should be connected to the "off stage" beam by a steel spacer.

Most modern theatres are providing a loading platform, which is shown in the drawing and which provides easy accessibility to the counterweight carriages for the purpose of changing weights. It also provides a storage capacity for extra weights.

DRESSING ROOMS

The location of dressing rooms is always a problem and in the drawing we have shown these located at the rear of the stage, which is a very good place for them. In many cases where the rear of the theatre faces a well traveled street it is possible to elevate these dressing rooms enough to provide several small stores underneath, which bring in added revenue. The dressing rooms may also be located on the "off prompt" side and elevated above the stage but this has some objection in that the average stage, from time to time, will use flats at least 18 feet in height and it would be impossible to store them underneath this balcony housing the dressing rooms.

In some of the older theatres dressing rooms have been very well placed in the basement but where they are placed in the basement or on a balcony it is always advisable to check with the city fire regulations and determine if required fire escape accommodations can be provided. Washrooms and toilets are also necessary.

The dressing room table should not be more than 20 inches wide and extending the longest way of the room, in front of which should be provided a full length mirror properly lighted. Each room should be equipped with plug-in sockets for pressing irons, and so forth, and plenty of coat hooks and hangers should be supplied.

STAGE FLOOR

In many cases this phase of stage construction has been neglected. The front of the stage from the apron back to the main act curtain should be finished with hard maple with the grain running up and down stage. The main part of the stage, back of the main act curtain, can be constructed of hard pine or similar material and the floor laid with the grain running across stage, for the reason that props, pianos and heavy equipment is skidded on and off stage in this direction and when handled with the grain of the floor less damage results to the floor.

The off-stage floor should be constructed of some type of soft wood. This soft wood permits the use of stage pegs, etc. This section of the floor gets quite a lot of abuse and it is sometimes necessary to replace one or more boards, but where the floor is laid as shown in the drawing this becomes an easy matter.

It will also be noted that the off-stage side corresponds with the loading dock and thus incoming and outgoing material is handled with the grain of the floor.

DRAPERIES

The proscenium curtain and valance should be of the same material and of a color that will harmonize with the interior of the auditorium. The material should be opaque. Where the lighter materials are used it will be necessary to use a good, heavy grade of lining.

The grand drape, tormentors and main act curtain should be of heavy, opaque material, preferably velour, and all three pieces should be made of the same material.

Back of the main act curtain practically any material and any color may be used, but in selecting colors and materials it is necessary to consider the effect that lighting will have both on the color and the figure design. Neutral colors should always be used and very dark material should be avoided.

In the case of the cyclorama and cyclorama borders these two pieces should be of heavy material and opaque.

We cannot over-emphasize the point that all draperies should be hung on counterweight sets. Cloth material is greatly affected by weather conditions and stretches and contracts accordingly. Nothing looks quite as bad on a stage as a beautiful curtain dragging on the floor or hanging three or four inches above the floor with some improvised material placed at the bottom. It is obvious, therefore, that all curtains and drapes should be so rigged that they are readily adjustable to meet this condition, and also to save unnecessary wear on the material.

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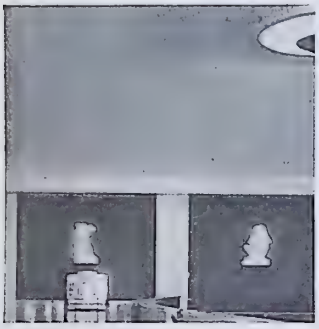

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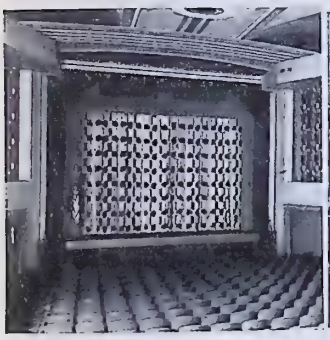

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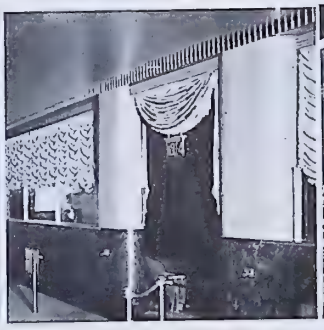

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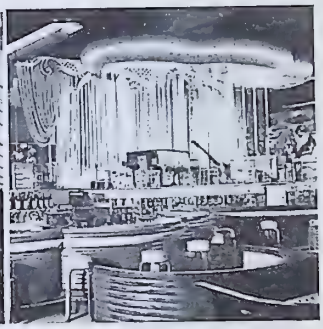

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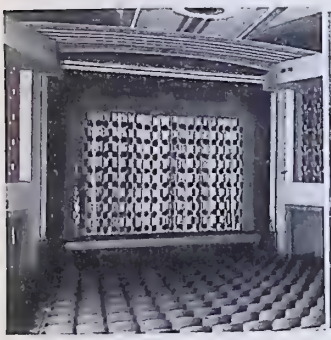

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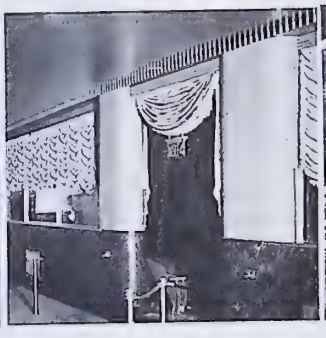

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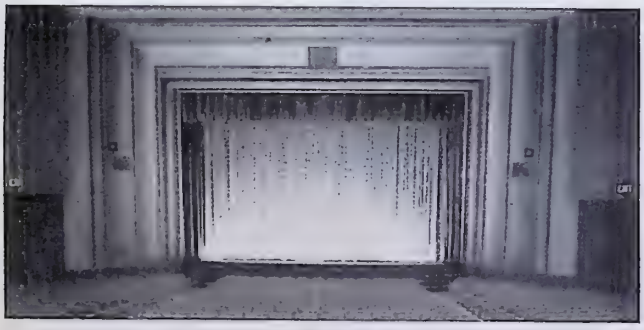

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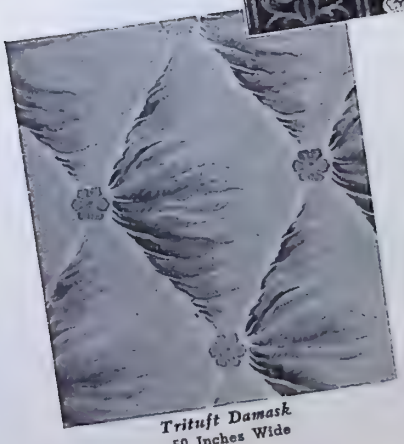

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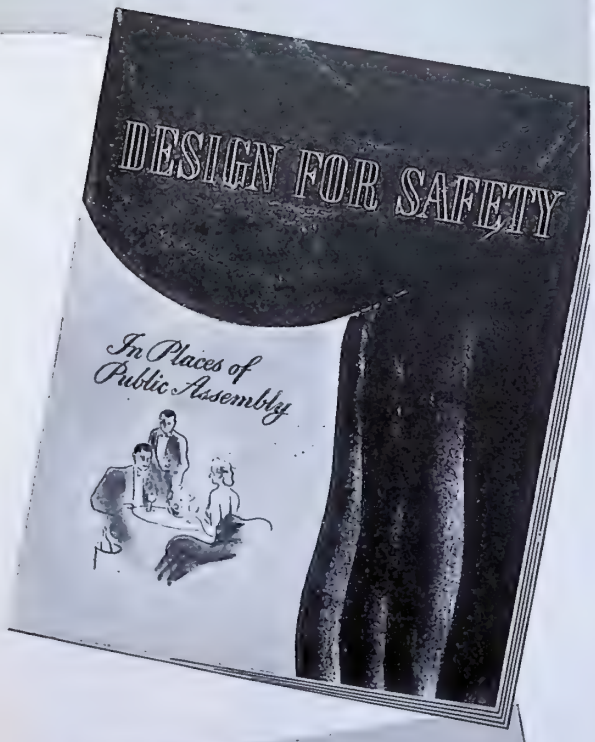

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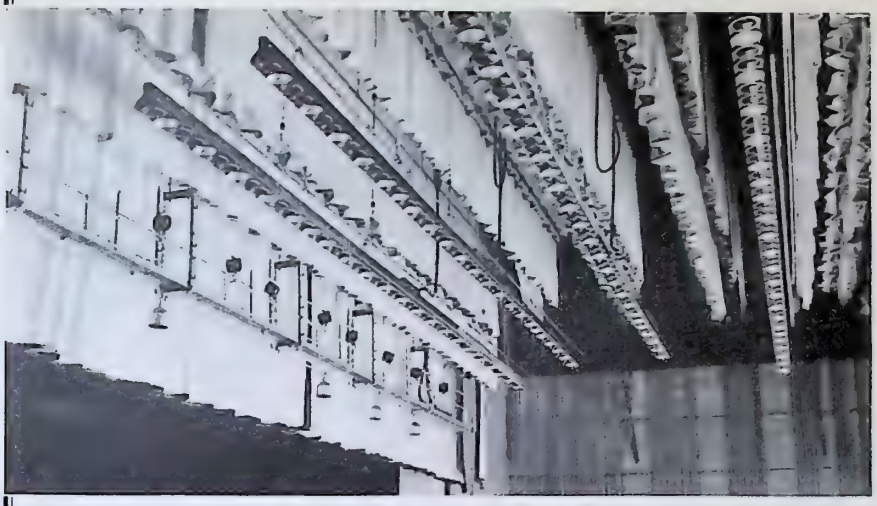

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THROUGH 46 years of continuous service to the Theatre we are established consultants to architects and stage designers, qualified to advise, prepare estimates and complete detailed blueprints for your requirements. These years of experience, gathered through practice are invaluable when planning the stage or interior decoration whether for new construction or modernizing work.

I. WEISS and SONS

and SONS

RIGGERS • MANUFACTURERS

DESIGNING DECORATING

We are qualified, through experience, to design the stage and interior for the new theatre or the one undergoing a modernizing job. To execute the designed plans—paint, supply and install murals, wall covering, acoustic treatment, plastic ornaments, curtains and all the work needed to finish a job—the work is entrusted only to expert workmen who have the "know how" to uphold the Weiss Standards of workmanship.

RIGGING

A practical approach and familiarity with the problem of RIGGING, gained through years of experience, are our contribution in insuring a well-planned stage. A long list of installations is our mark of accomplishment and your reference as to the accuracy, quality and precision of our service and workmanship. In a modernizing job it's wise to get rid of antiquated and unsafe equipment and replace it with new, safe and guaranteed products.

MANUFACTURING

We manufacture and supply guaranteed products of the best quality and workmanship. Stage Curtains, Wall Covering, Rockwool Sound Proofing, Stage Rigging, All-Steel Noiseless Curtain Tracks, Curtain Controls, Asbestos Curtains, Draperies, Exit Curtains, Curtain Motors, Cyclorama Settings, Scenery, Stage Hardware, Border, Foot and Spot Lights, Lighting Effects, Standee Posts and Velour-Covered Roping.

FABRICS

Weiss Fabrics are of the best, chosen for fastness of color and durability. Special patterns woven to meet design requirements whenever necessary. GLASS FIREPROOF FABRICS IN A VARIETY OF COLORS AND DESIGNS . . . their fireproof feature will make them the fabric of tomorrow.

BARRIER ROPING and STANDARDS

Velour-covered Barrier Roping is both useful and decorative wherever crowd-control is needed. The STANDARDS: Portable, Removable or of the Permanent Type are finished in brass, chromium, statuary or iron-painted. Also Wall Plates in the same finishes as the Standards. We make 3 sizes of roping: ½", 1" or 1½" in diameter. PATENTED CHAIN-CORE ROPING 1½" in diameter. 1½" White Standee Tape with Swivel Snaps. Send for descriptive literature.

FOR WHOM WE WORK

ARCHITECTS: Coolidge, Shepley, Bulfinch & Abbott, John Eberson, Eggers & Higgins, F. A. Elsasser, Hacker & Hacker, Norman Bel Geddes, Shreve, Lamb, Harmon, Ernest Sibley, Tooker & Marsh, Walker, Voorhees, Foley & Smith, Walter Dorwin Teague. STAGE DESIGNERS: Boris Aaronson, Lemuel Ayres, Howard Bay, Stewart Chaney, Raul Rene Du Bois, Frederick Fox, Norman Bel Geddes, Edward Gilbert, George Jenkins, Robert Edmond Jones, Samuel Leve, Jo Mielziner, The Motley's, Donald Oenslager, Lee Simonson, Raymond Sovey.

THEATRES WE HAVE DONE

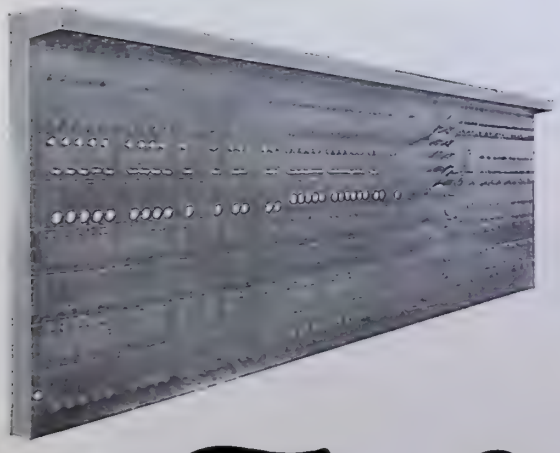
Radio City Music Hall, Radio City Center Theatre, Billy Rose's Ziegfeld Theatre, Music Box Theatre, Lyceum Theatre, Empire Theatre, Florida Theatre, Florida, Carolina Theatre, Charlotte, N. C.

445 WEST 45th STREET, NEW YORK

Back Stage

Typical FA Dimmer Switchboard for schools and small auditoriums. This manually operated switchboard provides individual switching control and color group dimming control.

Typical Pilot Switchboard of the Ten Pre-Set Type FA Remote Control System. Pre-set feature permits switching controls to be set up for an entire show in advance with an All-Master switch controlling all lighting scenes. Two or more All-Master Switches can be operated simultaneously for a nearly unlimited number of lighting effects.



. . . OF MORE THAN 500 THEATRES THROUGHOUT THE COUNTRY . . .

FA

STAGE LIGHTING CONTROL SYSTEMS *PLAY THE LEADING ROLE*

For more than a quarter of a century, Frank Adam Electric Company has been widely recognized as a leader in the design and construction of all types of stage switchboards and dimmer control apparatus for theatres and schools.

In more than 500 theatres and auditoriums, including the world-famous St. Louis Municipal Theatre and the King of Siam's private movie palace, Frank Adam equipment is playing a leading role in stage lighting.

Supplied on the unit basis, Frank Adam's equipment is extremely flexible. Present needs can be ordered now and additional units added when required. For real performance "back stage" to rival that "on stage," specify FA . . . designers and builders of the following top-ranking stage and auditorium Lighting Equipment:

SWITCHBOARDS

Manual Control
Modified Pre-Set Remote Control
Multiple Pre-Set Remote Control
Electronic Tube Control
Mobile Color Lighting Control

DIMMER EQUIPMENT

Resistor Dimmers
Auto-Transformer Type
Reactor Type

Frank Adam
ELECTRIC COMPANY
3652 Windsor Place St. Louis 13, Mo.

POWERSTAT

THEATRE DIMMERS

With their smooth control, power-saving capabilities, small size, and negligible heating characteristics; POWERSTAT Theatre Dimmers provide the superior method of dimming lighting equipment. These continuously-tapped auto-transformers permit the light output of individual or a whole bank of lamps to be steplessly varied from black-out to full brilliancy in an effortless manner.

To meet each need, both manual and motor-driven units are offered in a variety of models to control 1 to 100 kilowatts of power. An example of the compactness and large power controlling capabilities packed into a POWERSTAT Theatre Dimmer is the manually operated, Underwriters' Approved type 11D56 pictured. This dimmer operates from a 50 or 60 cycle 115 volt single phase power line to deliver from zero to 4600 watts output. The mounting space required is only a little more than the size of this page. If push-button control is desired, motor-driven units are available. The wattage output is variable throughout the range by finger-tip adjustment either at the load point or from some remote location. In contrast to most types of motorized dimming equipment, Motor-driven POWERSTAT Theatre Dimmers permit the power being fed to the lights to be set to exact values.

Standard POWERSTAT Theatre Dimmers are available in 115, 230, or 440 volt single or poly phase models to suit each requirement. Shipments are prompt.

PORTABLE DIMMERS

When loads of low wattage must be accurately controlled, it is recommended that the portable POWERSTATS such as type 116L be employed. Although the 116L is easily carried, 1000 watts of step-less variable power from zero to maximum can be achieved through knob adjustment. Other portable dimmers are manufactured to satisfy all lighting control needs.

CUSTOM BUILT DIMMERS

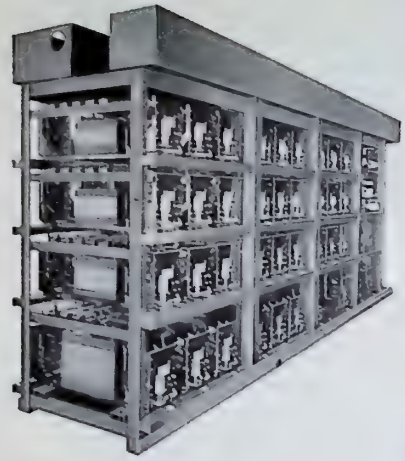
Since it would be impractical to list, as standard, completely assembled banks of POWERSTAT Theatre Dimmers, all large installations are classified as custom-built equipment. An outline of your particular problem is necessary to assure the form of construction most adaptable. Custom-built POWERSTAT Theatre Dimmers are available with inter-lock arrangements in both manual and motor-driven models. Depending upon the application; desk, console, or panel board can be designed.

For further information, write for catalogs or consult SECO engineers.

SEND FOR BULLETIN 150 CT

THE SUPERIOR ELECTRIC COMPANY
855 LAUREL STREET • BRISTOL, CONNECTICUT, U. S. A.

LIGHTING CONTROLS



REACTANCE DIMMERS

The Hysterset "Electronic" Dimmer for Theatre Lighting Control has miniature control devices permitting use of small pilot control switchboards of desk, console or panel type. The most modern system for the modern theatre. Write for Bulletin 74.

TYPE SRD
NON-INTERLOCKING DIMMERS

Resistance type for small theatres, churches, etc. Can be arranged for front or back-of-board mounting. When ordering, specify type of mounting, total wattage of connected load, voltage, and whether two or three wire. Write for Bulletin 71.

For 115 Volts 2-Wire

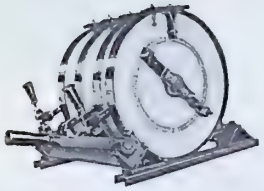
Catalog No.	Watts Min.	Watts Max.	No. of Steps	Size & No. of Plates
71—102	60	150	32	1—8"
71—103	155	250	32	1—8"
71—104	255	400	32	1—8"
71—105	405	550	32	1—8"
71—106	555	650	32	1—8"
71—119	655	750	54	1—13"
71—107	755	1000	54	1—13"
71—108	1005	1350	54	1—13"
71—109	1355	1650	54	1—15½"
71—110	1655	2000	68	1—15½"
71—111	2005	2450	68	1—18"
71—120	2455	2700	68	1—18"
71—112	2705	3000	68	1—18"
71—113	3005	3300	54	2—15½"
71—114	3305	4000	68	2—15½"
71—115	4005	4900	68	2—18"
71—116	4905	6000	68	2—18"
71—117	6005	7350	68	3—18"
71—118	7355	9000	68	3—18"

For three-wire service, use above list for each half of total load. Thus: 3 wire 2000 watt would require 2 No. 71—107 plates.

AUTRASTAT DIMMERS

Auto-transformer type dimmers operating on 110-120 volt 50-60 cycles alternating current. Transformer winding is connected directly across the A.C. line. A bared surface of the winding permits electrical contact with a movable contact. The voltage applied to the lamp circuit is that between the movable contact and one end of the Autrastat winding and can be adjusted to give any desired intensity. Autrastat Dimmers may be interlocked or non-interlocked arranged in banks for manual or motor drive. Catalog 76-14. 4,000 watt, 120 volt.
Write for Bulletin 76.

TYPE RD



INTERLOCKING DIMMERS

Resistance type units arranged in frameworks for floor, wall or other types of mounting. Each dimmer plate is equipped with an interlocking lever for master control of multiple plates or grand master control of several tiers of plate assemblies. With double interlocking masters and a worm wheel drive, slow motion cross control may be obtained. Write for Bulletin 72.

For 115 Volt 2-Wire Circuits

Lamp Load in Watts	Size and No. of Plates
200 to 2200	1—15½"
2201 to 3000	1—18"
3001 to 3600	1—18"
3601 to 4400	2—15½"
4401 to 6000	2—18"
6001 to 9000	3—18"
9001 to 12000	4—18"

Specify on order exact wattage of each circuit and dimmers of suitable ratings will be selected.

TYPE BD DIMMERS

Resistance type dimmers suitable for large house, portable box or talking picture studios. They may be arranged for wall, board or floor mounting with or without interlocking levers for controlling two or more circuits. Write for Bulletin 71.

115 Volts 2-Wire

Catalog No.	Watts Min.	Watts Max.	No. of Steps	No. of Plates
71—8061	1200	1500	58	1
71—8062	1500	2000	58	1
71—8063	2000	2500	58	1
71—8064	2500	3000	58	1
71—8065	3000	4000	58	1
71—8066	4000	5000*	58	1
BD—161	5000	6000	58	1
71—8068	6000	8000	58	2
71—8069	8000	10000	58	2
BD—151	....	5000*	58	1

***Use No. BD—151 for 5000-watt loads consisting of 500-watt or larger lamps.**

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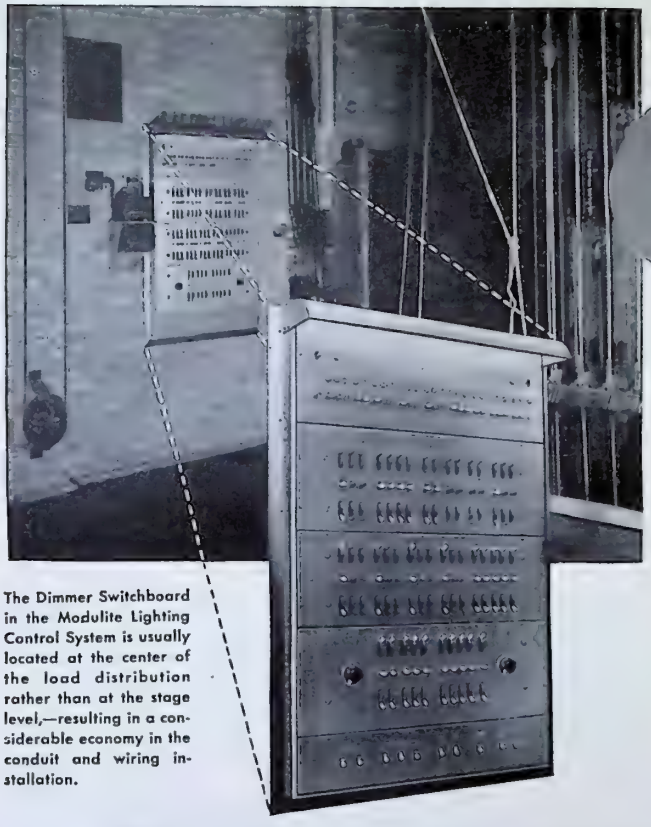


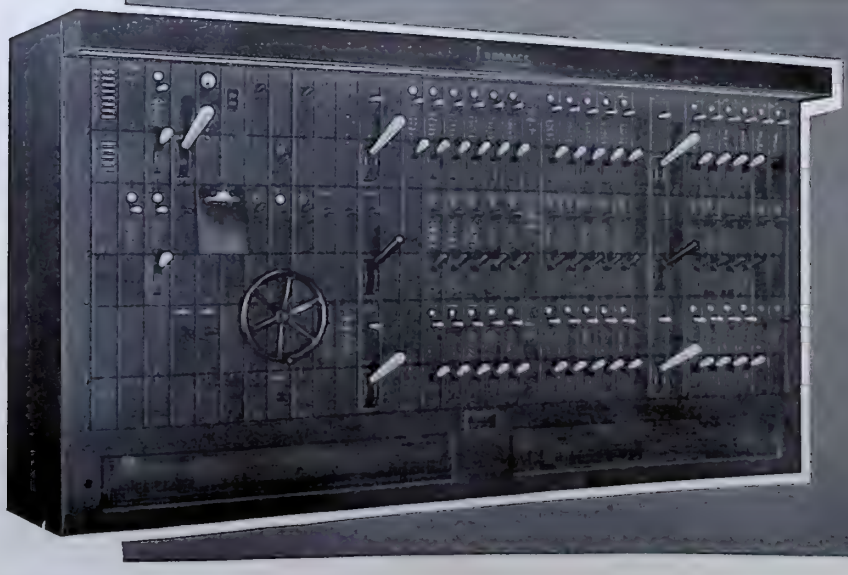
The Dimmer Switchboard in the Modulite Lighting Control System is usually located at the center of the load distribution rather than at the stage level,—resulting in a considerable economy in the conduit and wiring installation.

WURDACK MAJOR MODULITE LIGHTING CONTROL SYSTEM

for THEATRES
AUDITORIUMS
RADIO PRODUCTION CENTERS
SCHOOLS—COLLEGES
THEATRE—RESTAURANTS
LODGE BUILDINGS

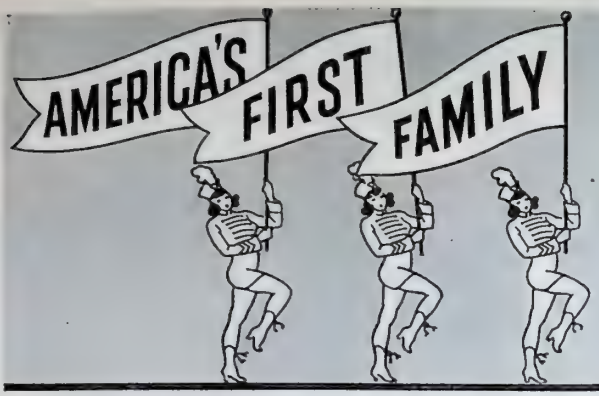
The Modulite Lighting Control Pilot Switchboard appearing in the illustration has 43 4000-watt Dimmer Controls in 2 presets and 24 Individual Contactor Controls with Master Blackout coupled with a number of unique features including Dual Fader control, two simultaneous Dimming speeds and Remote Fader Mastering. Due to the compactness of the design of the Pilot Switchboard a minimum of wall space is required.

WURDACK MULTI-PRESET STAGE SWITCHBOARD



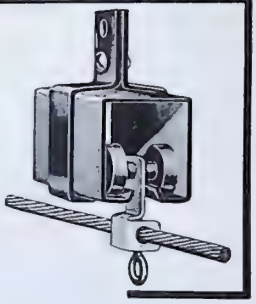
A typical Wurdack Multi-Master Pre-Set Pilot and Dimmer Switchboard which is usually located at the stage level with the Remote Control Switchboard located elsewhere in a fire-proof and sound-proof room.

This switchboard has provision for 48 individual sections each with Theatre Switch, Indicating Bull's Eye, Five preset switches and dimmers ranging in capacity from 2000 watts to 24,000 watts. Also Color Master sections, Stage Master, Pocket Master, House Master and All Master Preset switch control sections with Slow Motion Grand Master for the Dimmers.



# of CURTAIN TRACKS and CURTAIN CONTROL EQUIPMENT

THE RIGHT CURTAIN TRACK

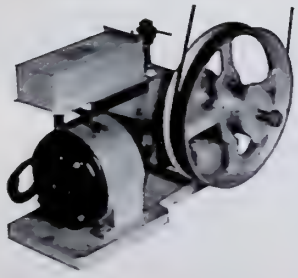


Nothing contributes as much to bring out the full dramatic value of appropriate draperies as the tracks upon which they travel. **SILENT-STEEL, BESTEEL** and **FENESTEEL** fireproof curtain tracks all provide the best developed method. All three are the same general design. Special wheels, ball bearing construction throughout, perfect alignment and liberal clearances result in smooth, quiet and almost effortless operation. The installation is simple and rapid. Specify one of these three leaders to fit your job. **IMMEDIATE DELIVERY.**

B E S T E E L — **Medium-Duty**

SILENT STEEL — **Heavy-Duty**

F E N E S T E E L — **Light-Duty**



PUSH BUTTON SIMPLICITY

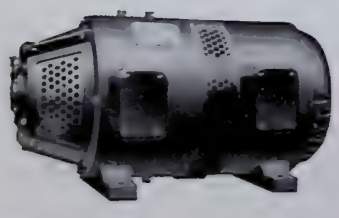
The automatic control operation of **AUTODRAPE** and **SILVER SERVICE** curtain machines assures the uniform opening and closing of curtains at just the right moment by the mere flipping of a switch. For more than 25 years these curtain machines have been universally used to accomplish the smoothest and most reliable operation in the simplest possible manner by push-button control from any number of points desired. All **AUTODRAPE** machines are equipped with the same motor gear reduction unit, base driving pulleys, and automatic reversing switch mechanism. The **SILVER SERVICE** machine has twice the power and 30% greater speed and is recommended for heavier curtains. For guaranteed dependable operation, specify one of these leaders.

AUTODRAPE Curtain Machines

SILVER SERVICE Curtain Machines

A NEW STAND FOR CONTROL MACHINES

For years theatre men throughout the country have been asking for some sort of equipment with which to "get the control off the floor." The Automatic Devices Company, long the leader in curtain travelers again leads the field with its brand new **"STAND STEEL."** a control stand designed for **AUTODRAPE** machines. Today much importance is attached to good stagekeeping. Theatre owners naturally want to conserve their equipment. **STAND STEEL** has been put on the market to attain this end—to assure longer life for your **AUTODRAPE**—to eliminate dust and foreign particles normally accumulated while machine was based on floor. **IMMEDIATE DELIVERY.**



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STABILARC is recognized as the best method of converting alternating current into direct current for projection arcs. It is the one multiple type motor-generator in which the full possibilities have been exploited to the highest degree. That is why you so often hear the projectionist say, "Save with **STABILARC.**" **STABILARC** has long been recognized as one of the most efficient and reliable motor generators in the trade. It is constantly being improved upon by highly trained engineers whose ideas are modern and farsighted toward future trends.

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All Round the World

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WORLDS LEADING MAKER OF
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Such improvements often run far in advance of actual production. For this reason, on problems of Curtain Control and Special Operating Devices, it will always be well to apply for up-to-date knowledge from

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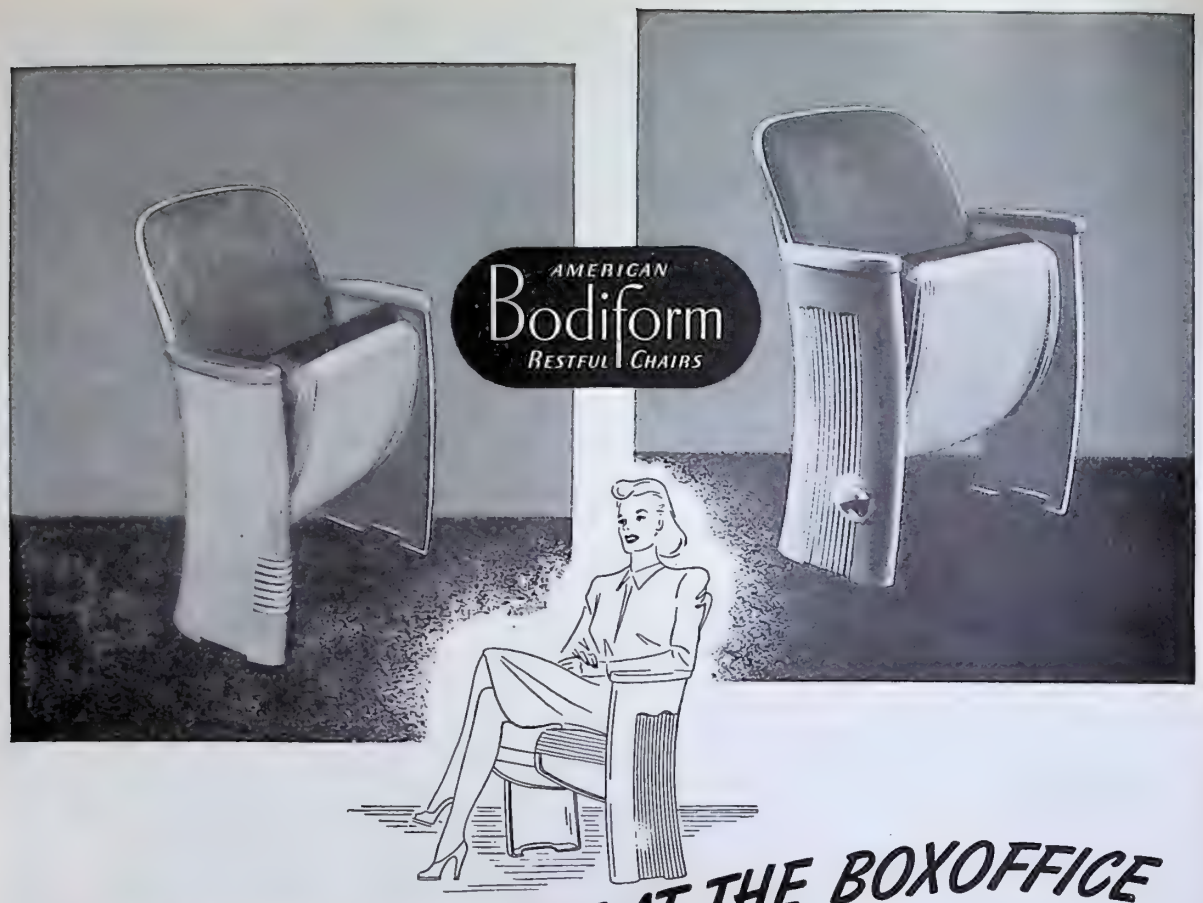

COMFORT PAYS OFF AT THE BOXOFFICE

YOU have to be comfortable to enjoy a show—and comfort is what these stylish "American" Bodiform Chairs provide in full measure! It's the kind of easy, restful comfort that lets your patrons really relax and have a good time. The kind that keeps them coming back. That's why these beautiful new Bodiform Chairs are boxoffice hits wherever they're featured!

Bodiform Chairs pack a lot of potent appeal for you, too. These smart, streamlined theatre chairs save space, make possible quicker, more economical housekeeping. They feature smooth, quiet operation and "foolproof" construction that slashes maintenance costs to the bone. And they're built to last and last.

So, look to "American"—as thousands of theatre owners the nation over are doing—for the finest in theatre seating. And remember, our engineers are always ready to help you solve your individual seating problems. Write today for full details.

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You can't tell people HOW they must sit . . .

But you CAN tell if they're sitting comfortably!

Selection of the proper *seat cushion* is the big thing. If everyone sat the same way in a theatre seat—right square in the middle, for example—that would be one thing. But they don't.

So, it is imperative that you select seats cushioned so that patrons will be comfortable no matter how they sit—perched on the edge or however . . . Such seats are the new Heywood-Wakefield models, like the one pictured above. This cushion is of full coil-spring construction, *plus* spring edge comfort built-in. Further, it has a steel frame which makes for unusual durability.

Easier, far easier, to re-upholster, too. No tacks or wood required when you re-cover; the saving in time and money is obviously considerable . . . In line and finish, too, these Heywood-Wakefield seats have that "wanted" modern look, and they harmonize well with your own scheme of decoration.

Helpful consultation service is promptly available through independent distributors or the Heywood-Wakefield sales offices in Boston, New York, Baltimore or Chicago.

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Here's the normal comfortable lounge-chair position of the Push-Back Theater Seat. Then, when a patron enters or leaves—

Seated patrons are not disturbed—a gentle movement of the body slides the seat back, providing adequate passing space.

Relax, and the chair slides back to its normal position. There's been no standing up, no interrupted vision, and no inconvenience.

It's a fact, proved by authentic surveys! The amazing new Kroehler Push-Back Seat is a real box-office attraction—every day in the year!

People do go out of their way to attend theaters equipped with this convenient, luxurious new seating. It's the only chair that eliminates standing to let others pass—affords maximum screen visibility at all times, with lounge-chair comfort.

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The Most Beautiful Chair ever presented for Theatres

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Solid steel construction throughout
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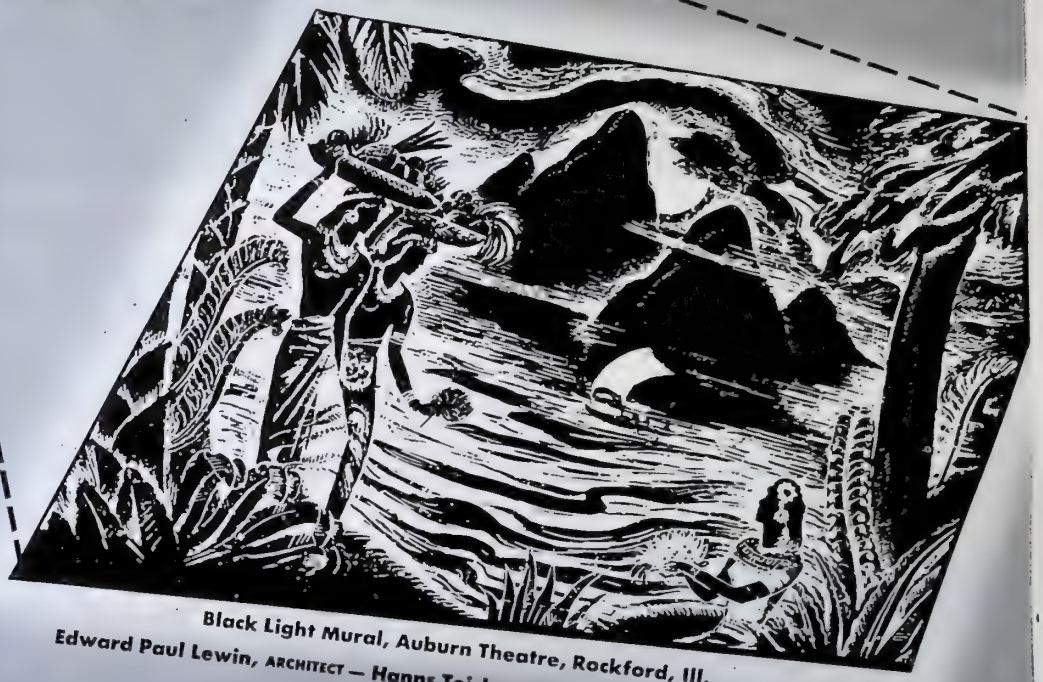

Black Light Mural, Auburn Theatre, Rockford, Ill.
Edward Paul Lewin, ARCHITECT — Hanns Teichert Studios, DECORATOR, Chicago

There's box office appeal in Black Light and fluoro-design. Fluorescent murals, fabrics and signs provide that invaluable atmosphere of rich beauty in any theater, small, large, old or new. Fluoro lacquers glow with shimmering brilliance under "the invisible ray" of Black Light. The secret of this unique decorative medium is simple but theater patrons are mystified with its magic radiance and vivid color. Black Light Products has an unequalled variety of materials for theater display and decoration and Black Light Consultants specialize in free advisory service to designers, architects and theater managers. Write today for full details.

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Impart the impression of complete re-modeling with

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★ Fascinating murals in colors of breath-taking splendor
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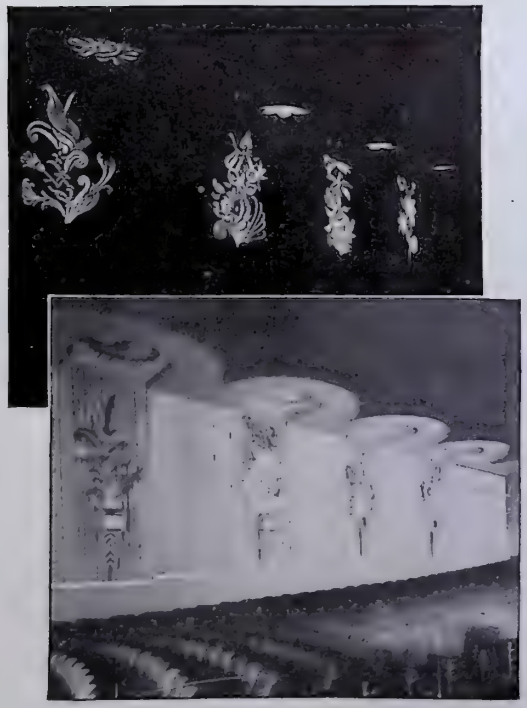
★ Dramatic atmospheric effects, with daylight scenes turning to glowing moonlight, and night scenes changing to beautiful sunrises



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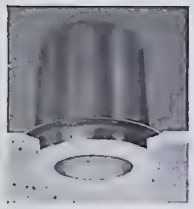
CENTURY EQUIPMENT covers every lighting requirement of the modern motion picture theatre, presentation house and legitimate theatre from facade to backdrop. Each Century unit is the result of extensive engineering research and wide experience. Century research goes on and its results will be brought to you in the future in better theatre lighting instruments.

Lighting for the Interior and Facade

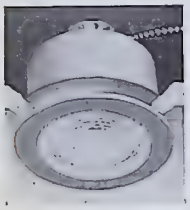


DOWNLIGHTS

Century has a complete line of recessed downlights for effective use in the theatre lobby and auditorium. Engineered to exacting standards they feature low surface contrast and sharp cut-off at the critical angle of glare. They project their light from a concealed source and create the illusion of a continuous unbroken ceiling area. All instruments take heat resisting color filters in standard and special colors.

PINHOLE SPOTLIGHTS

Century manufactures a line of compact spotlights which may be easily concealed in ceiling or wall. They project a shaped beam through a small aperture to highlight display material and architectural features. Six volt units with a 50 candle power source are manufactured for similar use in dimly lighted interiors.



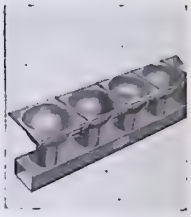
FLUORESCENT and INCANDESCENT FIXTURES

Century manufactures Fresnel lensed flush units and combined fluorescent and incandescent striplights and fixtures to suit every demand of theatre decor.

AISLE and STEPLIGHTS, EXIT SIGNS

Century designed aisle and steplights direct light downward from a concealed source. Century exit signs are manufactured in standard flush and surface types to conform to code laws.

COVELIGHTS



Century fluorescent and incandescent cove lighting provides indirect illumination from an invisible source. It supplies even light distribution over wall and ceiling without a revealing brightness pattern. Available in a variety of designs to meet the rigid interior lighting requirements of the modern theatre.

U-V BLACK LIGHT

Century ultra-violet black light units for use with fluorescent murals and auditorium carpeting add modern glamor to darkened theatre interiors. We manufacture a complete line of fluorescent paint and cloths for use with U.V. blacklight.

DRAMALITES

Century Dramalites are decorative in design and are effective for accent lighting posters and displays from the underside of the theatre marquee or in the lobby interior.

FLOODLIGHTS

Century outdoor floodlights are engineered in standard sizes and designs to beacon light your building face.

CENTURY Lighting Equipment

CENTURY LIGHTING, INC.

FOR THE THEATRE

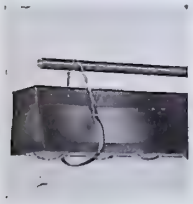
to backdrop

CENTURY'S ENGINEERING STAFF offers the benefits of long professional experience to designers, architects and owners in the specification, layout and selection of equipment. Consult us early, consult us often for practical solutions to your theatre lighting problems. We will gladly furnish additional information and data sheets covering the use and application of Century equipment.

Lighting for the Stage

LEKOLITES

The Century Lekolite provides a sharply controlled beam of high intensity with the aid of an elliptically shaped reflector and a precision lens system. Through the use of built-in vertical and horizontal shutters, the shape of the beam can be altered to give any simple geometric form. This control permits illumination of a definite area with a greatly increased amount of light. Available in 3″, 4½″, 6″ and 8″ lens sizes and wattage ranging from 100 to 2000 watts.



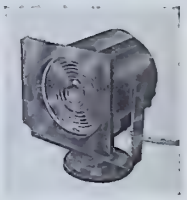
BORDER LIGHTS

Century border lights wired with individual Alzak reflectors are designed to take heat resisting glass roundels in the following colors: Green, blue, amber, straw and clear. Border assemblies include chain hangers and splice boxes.

FLOOR POCKETS and PLUG BOXES

Century manufactures a complete line of flush type and portable plug boxes for stage use.

FRESNELITES



Century Fresnelites are designed to give soft edge to the beam, wide variability of spread and greater efficiency without chromatic aberration and projection of the filament image. Its application is wide and the employment of these units has replaced the old fashioned hard-to-handle spotlights. Available in lens sizes from 3″ to 14″ and wattage from 75 to 5000 watts.

FOOTLIGHTS

Century disappearing and semi-open trough units are the professional standard for footlight installation. They are wired with individual Alzak reflectors and are designed to take heat resisting glass roundels in the following colors: Red, green, blue, amber, straw and clear.

DIMMERS

Century designs and manufactures portable and stationary dimmers and switchboards both of the resistance and variable transformer type. Dimmer and switchboards are built to specifications.

SEND NOW FOR CATALOG

CENTURY LIGHTING, INC.
NEW YORK, N. Y.

Gentlemen: Please send me your Theatre Lighting Catalog.
I am interested in: STAGE LIGHTING EQUIPMENT ☐
INTERIOR LIGHTING EQUIPMENT ☐

Name:_____

Address_____

Telephone No._____

is ENGINEERED L

419 West 5

CENTURY LIGHTING

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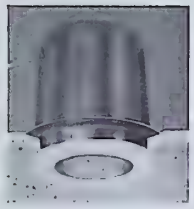
from Facade

Lighting for the Interior and Facade



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PLACE STAMP HERE

CENTURY LIGHTING, INC.

419 WEST 55th STREET

NEW YORK 19, N. Y.

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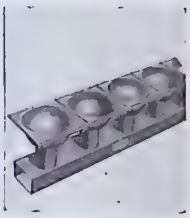

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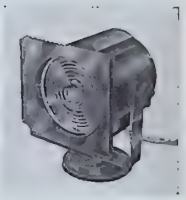

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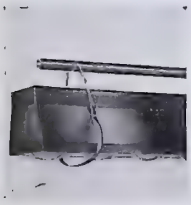

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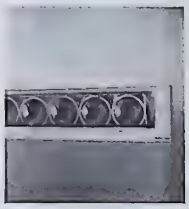

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SEND NOW FOR CATALOG

Containing illustrations, descriptive information, data sheets and prices of Century theatre lighting equipment.

is ENGINEERED Lighting Equipment

419 West 55th St., New York 19

VOIGT *Drinking Fountains with Illuminated Mirrors*

No. 100

Beauty
AND
3 USEFUL FEATURES
COMBINED IN ONE ATTRACTIVE UNIT

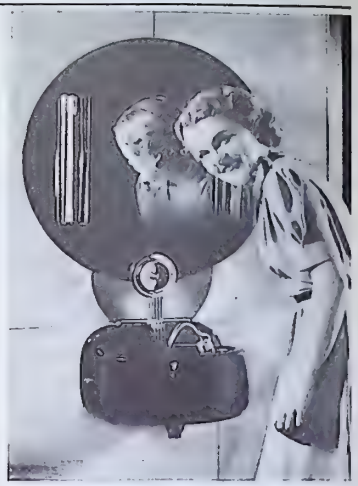
- **Sanitary Drinking Water**
- **Decorative Mirror**
- **Modern Illumination**

Do you want to create atmosphere and environment that will attract more business?

Do you want to provide comfort and satisfaction to please customers and make them come again and again?

Then use Voigt Drinking Fountains. Available with or without electric cooling equipment.

Roughing-in diagrams furnished with all details, measurements, etc., for installation, plumbing and electrical connections.



No. 101

Select the one you like best. . . . Include it in your building plans and specifications.

VOIGT *Exit and Direction Signs*

Wired with light sockets; complete ready to install, less lamp bulb. Illustrations approximately 1/12th actual size.

FLUSH TYPE

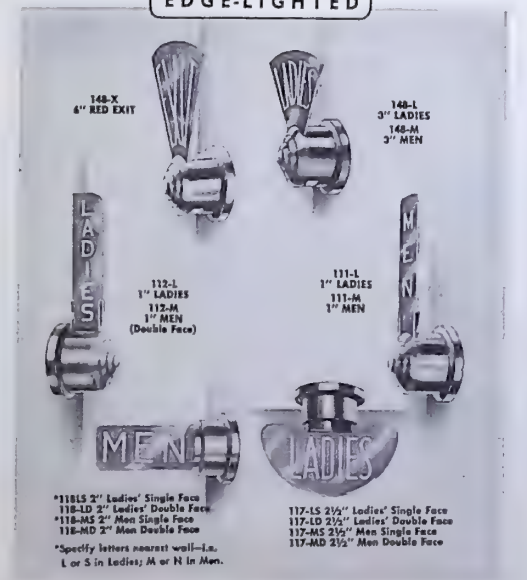
Metal Box
12"x6½"x3" deep
recesses in wall.

128-X
(6" EXIT)

128-L
(4" LADIES)
128-M
(4" MEN)

128-LP
(LADIES'
SILHOUETTE)
128-MP
(MEN'S
SILHOUETTE)

EDGE-LIGHTED



*118LS 2" Ladies' Single Face
118-LD 2" Ladies' Double Face
*118-MS 2" Men Single Face
118-MD 2" Men Double Face

*Specify letters nearest wall—i.e. L or S in Ladies; M or N in Men.

117-LS 2½" Ladies' Single Face
117-LD 2½" Ladies' Double Face
117-MS 2½" Men Single Face
117-MD 2½" Men Double Face

SURFACE TYPE

Size 16½" x 7"

108-X
(6" EXIT)

108-M
(4" MEN)
108-L
(4" LADIES)

108-MP
(MEN'S
SILHOUETTE)
108-LP
(LADIES'
SILHOUETTE)

ANY LETTERING SANDBLASTED ON PLATE GLASS 4x12", 6x12" OR 8x12" SIZE. SPECIFY SIZE GLASS OR HEIGHT OF LETTERS

EXTENDED WALL
110 Single Face 110-A Double Face

FLAT WALL
110-B Single Face

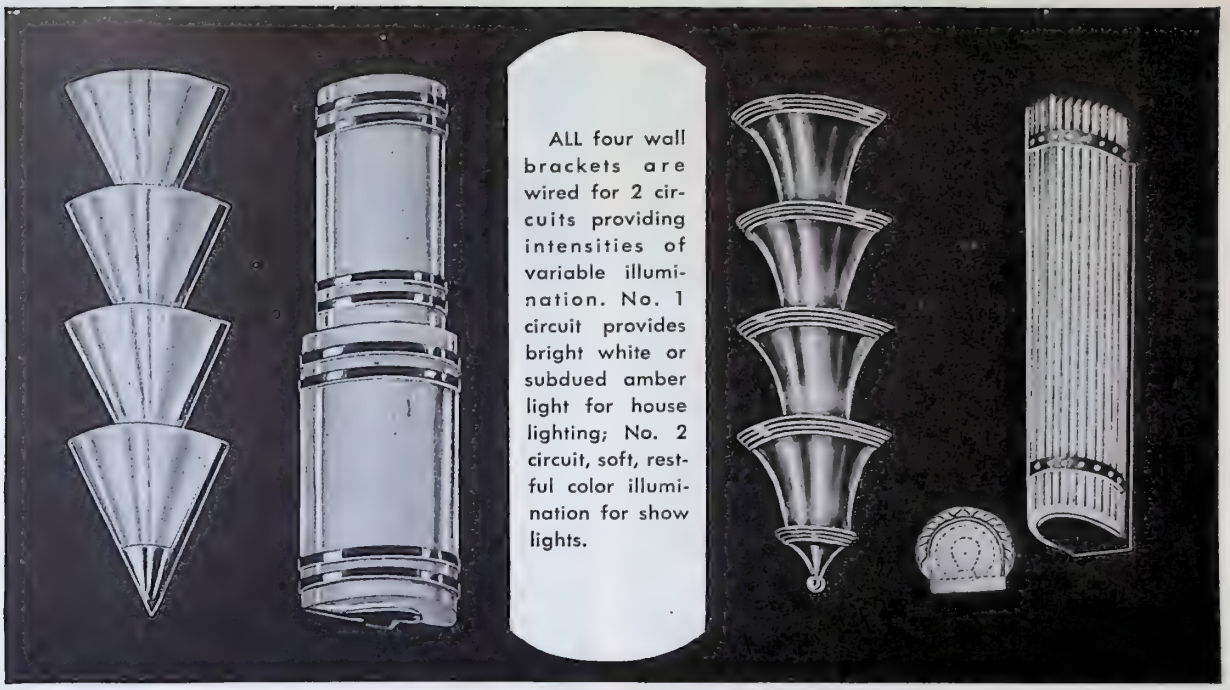
CEILING
110-C Single Face 110-D Double Face

VOIGT COMPANY
Illuminating Engineers,
Designers and Manufacturers

44th Year

1649 NORTH BROAD STREET
PHILADELPHIA 22, PENNA.

SEMI-INDIRECT LIGHTING | **INDIRECT LIGHTING**



ALL four wall brackets are wired for 2 circuits providing intensities of variable illumination. No. 1 circuit provides bright white or subdued amber light for house lighting; No. 2 circuit, soft, restful color illumination for show lights.

No. 144 — White Alabaster glass. 4 section illustrated. Made in 1, 2, 3, 4 or more sections; 3 lights in each section. Metal parts finished in gold.

No.	Sections	Size	Lights
144	4	40x12″	12
143	3	31x12″	9
142	2	22x12″	6
141	1	12x12″	3

No. 122-A—Half cylinders of White Alabaster glass. Two sections illustrated. Made in 1, 2, 3 or 4 section in 6, 8, 10 and 12″ diameter glass. Metal parts finished in gold.

No.	Sections	Size	Lights
121	1	16x6″	3
121-A	1	18x8″	3
121-B	1	20x10″	4
121-C	1	22x12″	5
122	2	38x10″	7
122-A	2	42x12″	9
123	3	54x10″	10
123-A	3	60x12″	12
124	4	74x12″	15

No. 154—All metal for Indirect Lighting. 4 sections illustrated. Made in 1, 2, 3, 4 or more sections, 3 lights in each section. Aluminum finish.

No.	Sections	Size	Lights
154	4	37x12″	12
153	3	29x12″	9
152	2	21x12″	6
151	1	14x12″	3

No. 104—Metal louvred vertical fins conceal lamp bulbs yet allow a uniform glow of soft light to filter thru the openings similar to a Venetian blind effect. Top socket arranged for R-40 Reflector Flood lamp.

No.	Size	Lights
104	36x8″	13
104-A	24x8″	9
104-B	48x8″	17

HORIZONTAL FORMS FOR MODERN STREAMLINED WALLS

No. 106—5′ 2″ LONG
ILLUMINATED DOORHEAD WITH EXIT ON ONE CIRCUIT FOR SHOW LIGHTING

Bent frosted ribbed glass conceals 2 - 24″ Fluorescent lamps on separate circuit for house lighting. Metal parts finished in gold.

No. 109

Indirect Wall Bracket with luminous glass edges. Light is reflected up and down. Gold finish metal.

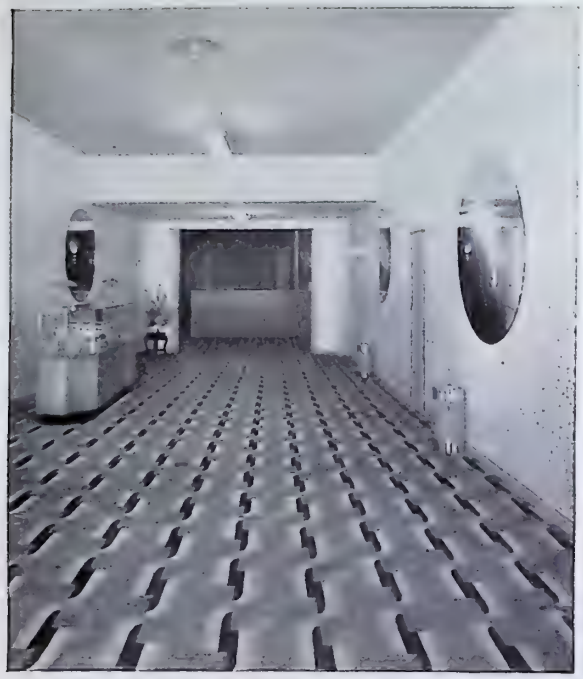
Number	Glass size	Lights	Circuits
109	26″ long	5	2 (3 x 2)
109-A	22″ long	4	2 (2 x 2)
109-B	18½″ long	3	2 (2 x 1)
109-C	16½″ long	2	1

VOIGT COMPANY
Theatre Lighting Specialists

QUALITY PRODUCTS SINCE 1903 VOIGT COMPANY PHILADELPHIA, PA.

1649 NORTH BROAD STREET
PHILADELPHIA 22, PENNA.

In Outstanding Theaters all



ABOVE: Star Theater, Tonawanda, N. Y.

ABOVE: Texas Theater, Dallas, Texas

BELOW: Twentieth Century Theater, Cincinnati, Ohio

BELOW: Metropolitan Theater, Houston, Texas

over the Country—the Steady Attraction is Mohawk Carpet!

YOU GET MORE CARPET WEAR FOR YOUR MONEY IN

MOHAWK "Traffic-Tred" CARPETS
BALANCED CONSTRUCTION FOR LONGER WEAR

They're BEAUTIFUL—Because of Mohawk's long experience in furnishing the right colors and patterns for every type of establishment!

They're DURABLE—Because of the Mohawk "Five Point" Star of Balanced Construction:

1 ★ Wool Blend
2 ★★ Pitch
3 ★★★ Rows per inch
4 ★★★★ Yarn size
5 ★★★★★ Pile Height

So if you're planning to re-carpet—see your Mohawk Contract Dealer first!

Write or wire for the name of nearest contract dealer!

MOHAWK *CARPET MILLS, Inc.*

295 Fifth Avenue, New York City

On...

...WITH THE OLD

In "show business", the applause goes to both the old favorites and the brilliant new stars. Their box-office appeal is proof of their quality, outstanding performance, assured satisfaction.

In theatre carpets, Crestwood has been audience wear-tested and approved. Whether you select the old favorites, still available for either new installations or replacement buyers, or the striking new designs, contemporary with modern architec-

"Where there's wear . .

Smith CO

ALEXANDER SMITH & SONS CARPET COMPA

In...

...WITH THE NEW

tural and interior trends, you'll be sure of getting both eye-appeal and satisfaction. Crestwood Carpet—made *from* the finest of selected white wools and dramatic colors, made *by* the most skilled of carpet craftsmen, made *for* those who demand the best possible carpet at the lowest possible price.

Crestwood

America's No. 1 Theatre Carpet!

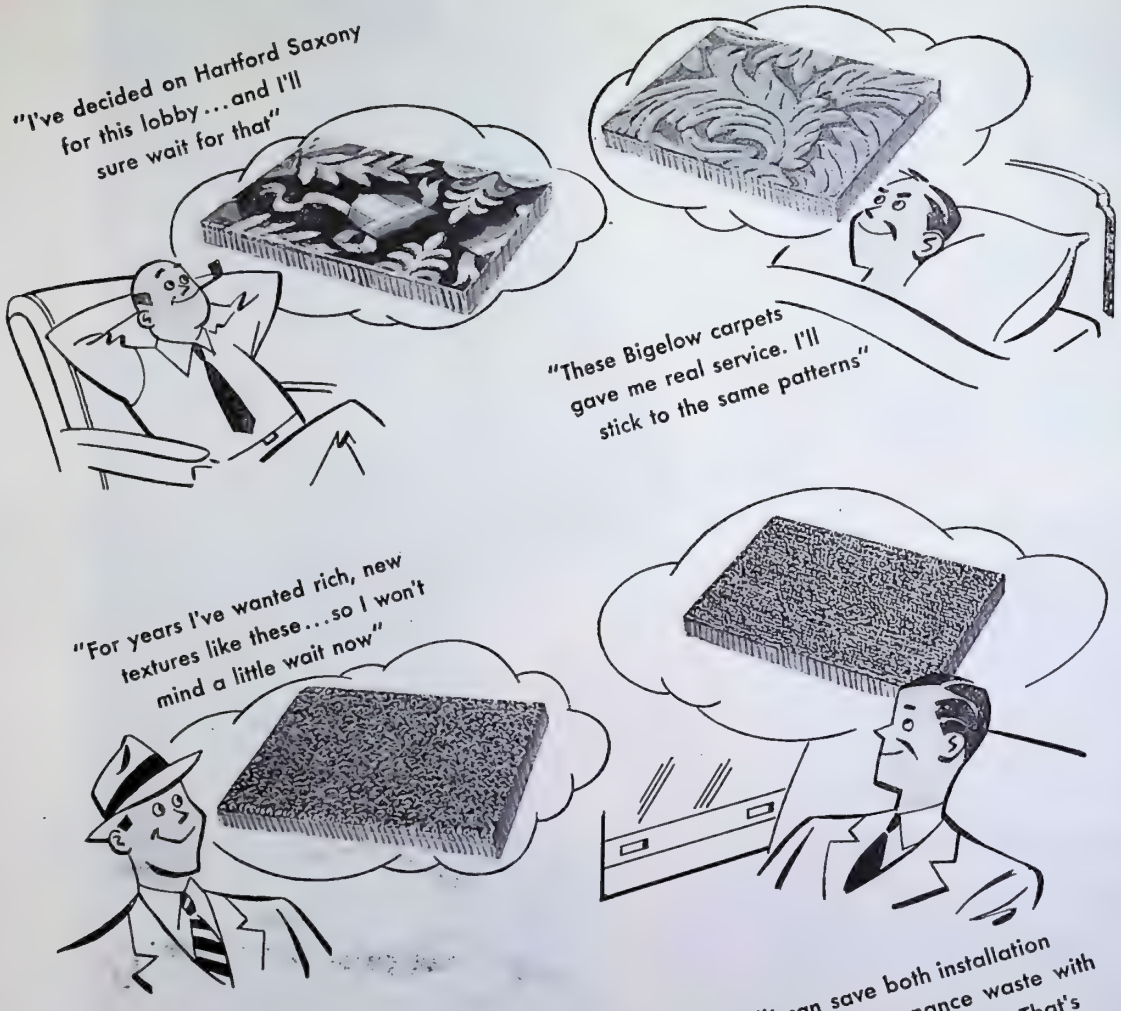
Buy Smith!"

TRACT CARPETS

295 FIFTH AVENUE, NEW YORK 16, N. Y.

To facilitate inquiry re the above, please mention the volume and page number.

About those NEW carpets . . .


"I've decided on Hartford Saxony for this lobby . . . and I'll sure wait for that"
"These Bigelow carpets gave me real service. I'll stick to the same patterns"
"For years I've wanted rich, new textures like these . . . so I won't mind a little wait now"
"I can save both installation and maintenance waste with Bigelow Lokweave. That's what I want"

. . . It's worthwhile waiting

Bigelow carpet production is getting back to normal . . . and orders will be filled. Now's the time to plan redecorations. Ask your dealer about Bigelow's Carpet Counsel. It's an old, free service to save you time and money.

BIGELOW-SANFORD CARPET CO., INC.

140 Madison Avenue · New York 16 · N. Y.

BIGELOW WEAVERS

SECTION 2-C

LOUNGE *and* TOILET ROOMS

1946-47

Wallpaper and Its Use in Modern Theatres

New Types and Designs a Decorative Boon; Stain-Proof Covering to End Wall Doodling

JAMES H. RASMUSSEN
Vice-President in Charge of Sales and Merchandizing, United Wallpaper, Inc.

Reconverted from their wartime job of making incendiary bombs, products for chemical warfare, and other items of incalculable value in the late war effort, the wallpaper manufacturers of the United States are now in production on the most diversified, colorful, and highly styled array of wallpaper in the whole history of the industry.

THE CURRENT TRENDS

These wallpapers, all in colors that are fresh and gay, are created from patterns designed by the world's largest wallpaper art and design department devoted exclusively to interior decoration. Research on methods of bringing various lines of wallpapers to even higher artistic and functional standards than maintained before the war has been in progress since 1941. As a result, important new developments in the field—such as the introduction of plastic-coated wallpaper and DDT wallpaper—have taken place.

The new wallpapers—such as those of United Wallpaper, Inc., the world's largest wallpaper manufacturer—stress the soft shades that are becoming increasingly popular in living room and dining room papers. These new "liveable" shades have a clarity of color never before produced. And the colors themselves are in more pronounced contrast and so add heightened interest to any room in which they are used. Magnificent arrays of floral patterns, for example, are so diversified in pattern and design that they can be used to excellent advantage in every room.

Members of United's art and design department under the direction of William Burton, vice-president, and Adele Whitfield, director of the corporation's interior decorating department, have covered every possible need for attractive patterns from Provincial to Modern. Both of these artists, acknowledged leaders in their respective fields, have directed and inspired many of the fascinating innovations prevalent in the new United wallpaper.

They and their associates also have developed many adaptations of documentary types for Colonial and Victorian rooms. The new provincial wallpapers have been especially designed in small floral and conventional patterns, followed in prominence by ornamental patterns and beautiful scenics so characteristic of the period. Many of these new wallpapers can be used in ensembles—variations on the same theme—and may be combined in one room or used in adjoining rooms.

United's styling department is now completing the cataloguing of more than 1,000 new patterns, including 75 styles in the new plastic-coated wallpaper and ten new styles included in the Trimz ready-pasted line. Production of the new wallpapers and borders is now well under way, and increasing shipments are reaching the retail market.

THE EVERGLADE PATTERN of Varlar, the new stain-proof wall covering. Varlar is made by a patented process and a secret formula which permits the use of resins which have positive stain-proof, grease-proof, mildew-proof characteristics. These resins are fused by a new method on paper or cloth, so that the finished product, often in 10 to 14 colors, can be easily applied to walls and ceilings. The new paper has many possible uses in theatres.

NEW TYPES OF WALLPAPER

All these new 1946-47 wallpapers, in terms of design, styling and originality, far excel those of any previous year's production. The new patterns, for the most part, reflect an eagerness to turn away from the intensely vivid hues of the pre-war years and the somber tones of the war years toward soft pastel tones in patterned areas on lighter grounds. The spirit, in general, of these new wallpapers is one that is gay, carefree and light-hearted. In their decorative use many of the problems and anxieties of a war weary world can be forgotten.

The trend of the new wallpaper patterns shows a return of light figures against both light and dark backgrounds. This replaces the wartime use of dark figures when pigment was difficult to secure. These new patterns can be roughly classified into six major divisions of design:

(1) Pastoral and Colonial scenic patterns, especially effective in hallways, dining rooms and early American period rooms.

(2) Floral motifs in gay colors, particularly popular in breakfast rooms or informal dining rooms.

(3) All-over patterns in conventional designs for use in any room in the house.

(4) Climbing vines or floral motifs, most suitable for halls, bedrooms and dining rooms.

(5) Youthful and spirited plaids and drapery-like "weaves" with the latter based on Dorothy Liebes's celebrated fashions in fabrics.

(6) A new treatment of fruit clusters and floral bouquets done in flashing modern style, ideal for contemporary dining rooms and modern bedrooms.

All of these major pattern groups are destined to receive wide public favor over the summer and fall seasons. In appraising them all collectively there can be seen evidence in full measure that many members of the modern school of wallpaper designers are using a more-or-less impressionistic technique to achieve a freshness in pattern completely new to wallpaper design. The very boldness of this new approach will undoubtedly exert strong influence on present and future trends of interior decorating.

New "Weave" Wallpapers

Illustrative of the manner in which the decorative possibilities of a related field in interior design can be visualized is the way in which the new "weave"

patterns — now being distributed by United—were developed. These are accurate reproductions in wallpaper simulating many of the latest and most beautiful drapery and tapestry weaves designed by Dorothy Liebes, celebrated San Francisco fabric designer.

Internationally known for her brilliant fabric creations, she has been doing an unusual wallpaper styling job exclusively for United Wallpaper. United has reproduced more than 70 styles of these fabric patterns. Among the patterns included in Dorothy Liebes's individually created "weaves" in wallpapers are Bamboo, Basket Braid, Yarn Stripe, Fringe Cloth, Twill Bands, Fabric Stripe and Luster Cloth.

Dorothy Liebes believes that deep, rich tones are due for a come-back. These tones, she says, will naturally blend with the new bleached wood surfaces and will adapt themselves in drapery and upholstery pile fabrics.

United's "weaves" drawn from Dorothy Liebes's exclusively designed fabrics reflect her talent with colors in both vivid tones and in the often neglected neutrals. These wallpapers indicate that although her tastes are those of the most modern colorists, many of her fabrics and the wallpaper patterns drawn from them have a universal use with any period of interior design. Single rolls are 5 yards long and 30 inches wide.

Foil-Patterned Wallpapers

Some of the other types of new styles are designed in the modern trend which provides scores of patterns in a multitude of styles. Whether room stylings be Modern or Traditional or done in the increasingly popular mingling of the two—all can be attractively decorated with wallpapers whose tones complement and blend with the room's furnishings or serve as quietly distinctive backgrounds.

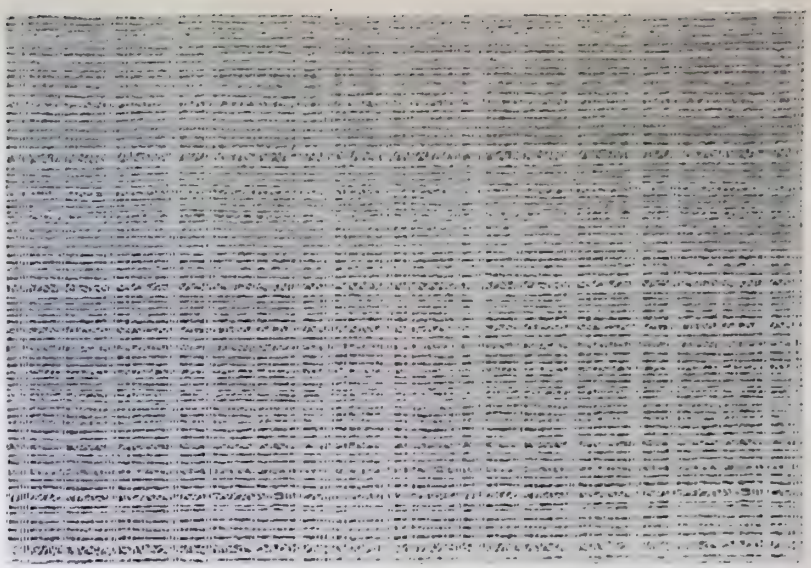
Featured among United's new series of wallpapers for modern interiors are Gardenia, Modern Plaid, Modern Key, Summer Festival and Bountiful Harvest. Some of the outstanding traditional patterns include Berry Lane, Avignon, Orleans and Quilt Blocks. Then there are many patterns whose decorative values lie in their use as foils for modern where a mingling of the traditional with the modern gives a certain spice to an otherwise austere room. Definitely serving this difficult purpose are such patterns as Windsor Damask, Balmoral, Portsmouth, Charleston Gardens and June Morning.

Among the new colors that seem to predominate in many of these new United wallpapers are the turquoise series of bluish-greens and greenish-grays; salmon pink and beige; pink and dusty rose; reds and the deep burgundies; silver gray and slate gray; Navy and soft blues; pale aqua and clear green; yellows, dark browns and chartreuse. Single rolls are 24 feet long and 18 inches wide.

Trimz Wallpapers, with DDT

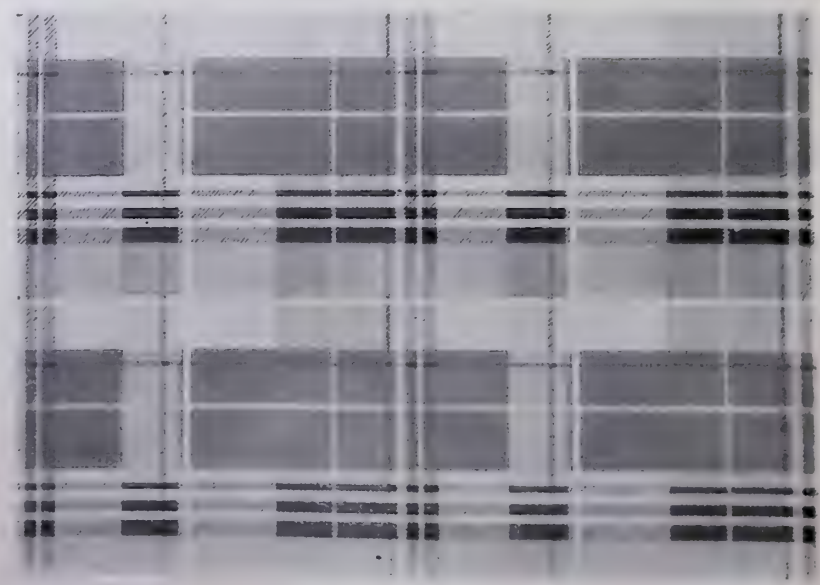
Ten new Trimz ready-pasted wallpapers have reached the market. Included in these new papers is a quartet of texture weave patterns in blue, rose, green and gray. All Trimz ready-pasted wallpapers and decorative borders are ready for instant use. The adhesive on the back will adhere to practically any surface and can be applied by either amateur or professional decorators. It can be used on walls and panels, furniture, around mirrors and many other articles such as scrap baskets, fancy boxes and cannister sets. Its use on painted surfaces opens to Trimz a new field in effective interior decoration. A box contains a roll 81 feet long and 18 inches wide, which is the usable equivalent of four single rolls of ordinary wallpaper.

Among the new Trimz wallpapers is the ready-pasted DDT cedar closet wallpaper containing 5 per cent of active DDT insecticide in the coating and colors. It is fade-proof, wall-tested, style-tested, and does not brush or rub off. Development of this genuine cedar wood wallpaper that kills moths, ants, silverfish, flies, mosquitoes, and other insects which come into contact with the surface, is the result of nearly a year and a half of comprehensive research in



THE MARITIME WEAVE PATTERN of Varlar, the new stain-proof wall covering. Although Varlar might be classed as a "thermo-plastic wall covering" because of the use of these resins in its composition, it should not be confused with the so-called plastic coated papers, which merely have plastic or laminated coatings. Varlar is a fusion of colors, paper, and plastic resins; accordingly, there is no tendency to chip, as experienced in other materials.

THE EDINBURGH PATTERN of Varlar, the new stain-proof wall covering. The newly developed manufacturing technique results in decorative effects simulating those of woodblock printing done by the old masters in the painting and decorating arts. Previously it has been impossible to reproduce these effects except in very expensive and fragile wall coverings. Theatre decorators have a material for achieving new and interesting results.



THE CHINTZ PATTERN of Varlar, the new stain-proof wall covering. Scheduled for production as soon as possible, Varlar, in the opinion of leading architects and interior decorators, may revolutionize the wall-covering treatment of homes and public buildings. Varlar will make it possible for walls and ceilings to be economically decorated, with no fear from stain, grease, crayon, ink, or numerous other disfiguring elements encountered.

United's laboratories. These findings were backed up by exacting tests at the Institute of Paper Chemistry, Appleton, Wisconsin, and with independent cross-checks at the Sentinel Laboratories, Springfield, Illinois. A box contains a roll 48 feet long and 15 inches wide. This narrow width simplifies the hanging in confined areas. Trimz ready-pasted cedar closet wallpaper is available, both with and without the DDT insecticide coating.

Also manufactured by United is a third and fourth type of cedar-wood wallpaper which is not of the ready-pasted variety. It is made, both with and without DDT. Single rolls are 24 feet long and 18 inches wide.

United's research staff has also recently developed a ready-pasted DDT ceiling paper, available in both white and ivory, that is on the retail market. Just as in the DDT cedar closet wallpaper, this new Trimz ceiling paper also features 5 per cent active DDT insecticide in the coating and colors.

Since most flying insects sooner or later alight on the ceiling, this is the most effective killing surface in the room. Tests and cross-checks at Appleton and Springfield show that a 5 per cent DDT insecticide "locked" into the paper is a sufficiently high content for efficient insect killing. Effectiveness in this paper is guaranteed for at least a year. The paper is odorless and is non-hazardous to humans and domestic animals. A box contains a roll 81 feet long and 18 inches wide, or a total of 121 square feet of ceiling paper.

THE MAGNOLIA PATTERN of Varlar, the new stain-proof wall covering. Varlar is 24 inches wide, and packaged in units 50 feet long, containing a total of 100 square feet. It is expected to retail at 10 to 15 cents a square foot, depending on the type and kind of pattern. A complete line of designs and flat pastel colorings will be offered, and each a new, original creation of a famous designer. All disfigurements can be removed with soap and water.

Griffin Salon Wallpapers

Another line is the Salon series of exclusive creations—many of them ensembles—by Robert B. Griffin, the internationally known wallpaper stylist and senior vice-president of United. This series contains more than 400 styles and expresses the latest ideas in wallpaper design and coloring. Among the most striking patterns in this series are Pavilion, Tropicale, Society Circus, and Paris in Spring. Single rolls are 21 feet long and 22 inches wide.

Ever since 1904 Griffin has been a notably influential figure in wallpaper style trends. His approach to better decorating is definitely reflected in his series of co-ordinated ensembles.

The Wishmaker Wallpapers

United also has introduced the Wishmaker series of ensembles. These wallpapers were created in 40 styles exclusively for the approximately 80 Wishmaker stores, and are marketed by these leading department stores throughout the United States and Canada.

The Wishmaker series is specifically designed to adorn the walls of Provincial American, Traditional or Modern suites with suitable color schemes designed to match the fabrics and floor coverings of each interior decorative style. Single rolls are 24 feet long and 18 inches wide.

Plastic-Coated Wallpapers

For the first time United is now offering a new and highly revolutionary plastic-coated series of wallpaper that has actually been tested to be 50 times more washable than regular wallpaper.

This is made possible through an original United process of applying a durable plastic coating which combines with the plastic content of the surface of the wallpaper, thus eliminating the possibility of cracking, peeling off, or distorting of the coating. As a result of this long sought-after process, a protective coating is achieved and the colors remain clear in tone, retaining their original fidelity. All 75 styles in this plastic-coated series of wallpapers were created to retain the freshness of their designs and color schemes in spite of the long life of the coated paper.

Plastic-coated wallpaper is supple and flexible and so may be hung as easily as any good quality, regular wallpaper. In addition, it is 50 times more washable than regular. Single rolls are 24 feet long and 18 inches wide.

VARLAR WALL COVERING

The word "indelible" has lost much of its meaning and most of its sting because of a recent development in wall

coverings. At least, there is no such thing as an indelible mark on a new type of wall covering that is now beginning to reach the market. Almost any known type of dirt or stain can be removed simply by washing with soap and water.

The Product Varlar

"Varlar" is the name of this new product. It is defined by the manufacturer as "a stain-proof wall covering."

Varlar is made by a patented thermo-plastic process and a secret formula which permits the use of resins which have positive stain-proof, grease-proof, mildew-proof characteristics. These resins are fused by a new method on paper or cloth, so that the finished product, often in ten to fourteen colors, can be easily applied to walls and ceilings.

Although Varlar might be classed as a "thermo-plastic wall covering" because of the use of these resins in its composition, it should not be confused with so-called plastic-coated papers, which merely have plastic or laminated coatings. Varlar is a fusion of colors, paper, and plastic resins. Accordingly, there is no tendency to peel or chip.

The newly developed manufacturing technique results in decorative effects simulating those of wood block printing done by the old masters in the painting and decorating arts. Previously it has been impossible to reproduce these effects except in very expensive and fragile wall coverings.

Uses of Varlar

Varlar, in the opinion of leading architects and interior decorators, may revolutionize the wall covering treatment of homes and public buildings.

Varlar will make it possible for walls and ceilings of public buildings to be economically decorated with no fear of damage from stain, grease, crayon, ink, or numerous other disfiguring elements.

Varlar-covered walls in the home will solve many present problems. They will be a boon in kitchens where grease and stains abound; in bathrooms where water and steam damage ordinary wall treatments; and in all other rooms where dirty finger marks, crayon smudges, or grease may injure the finish. All these disfigurements can be removed by scrubbing freely with ordinary soap and water.

Varlar is 24 inches wide and packaged in units 50 feet long containing a total of 100 square feet. It will retail at 10 to 15 cents a square foot, depending on the type and kind of pattern.

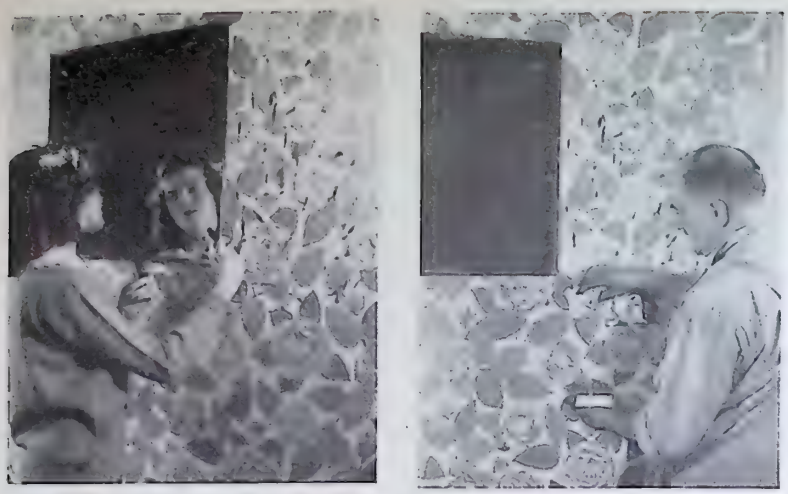
A complete line of designs and flat pastel colorings will be offered for the purchaser's choice, each one a new, original creation of a famous designer. The designs are unique in that they are processed in such a way as to give them the effect of hand-blocked papers in water colors. This is the first time in the history of interior decorating that it has been possible to achieve such an effect synthetically. How it is done is a trade secret.

Properties of Varlar

In laboratory tests Varlar has with-

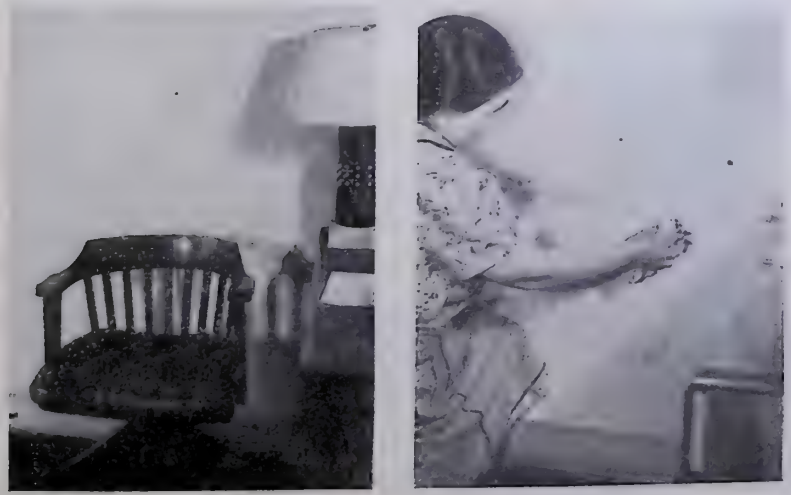
WALL DOODLING, the universal pastime of telephone addicts, is frustrated by the application of a damp, soapy cloth to the scribbled area, as shown above. The impatiently drumming digits frequently leave tracks around elevator signal buttons. But, as seen below, soap and water are a quick remedy. In both cases the new stain-proof wall covering, Varlar, made short shrift of any damage from the inevitable, albeit unintentional marks.

AREAS AROUND LIGHT SWITCHES are frequently smeared by fumbling fingers, and the effects (below) are cumulative, regardless of how careful everyone may be in the matter of clean hands. By having used Varlar as a wall covering, the worries from this source are removed, as the material can be easily and quickly cleaned with just ordinary soap and a damp cloth. Theatremen will not be long in appreciating the advantages of this covering.



LIPSTICK RUBBED ON WALLS beside mirrors—a common practice in public lounges and powder rooms—as every theatre man so very well knows—is easily removed (above) when the wall covering is stain-proof Varlar. Even paint (below) can be wiped away, with a turpentine cloth, if a hasty workman overshoots his mark, all of which is appreciated by theatre owners who take pride in periodic paintings in their programs of maintenance.

MARKS CAUSED BY TILTING CHAIRS or by the scuffing of chairs or other items of furniture against the wall can be cleaned off with almost no trouble at all with soap and a damp cloth when the wall covering is Varlar (below). Varlar will serve with success and adaptability in theatres. Tests made by paper hangers have demonstrated that Varlar can be applied as easily as any other type of wall covering. Varlar is made by United Wallpaper, Inc.



stood extremes of heat, cold, humidity and steam with no effect. It has been subjected for 30 consecutive days to a continual temperature of 160 degrees Fahrenheit, then suddenly chilled to 54 degrees below zero Fahrenheit, without damage in either test. Varlar has been exposed for 96 hours to 100 per cent relative humidity at 120 degrees Fahrenheit, and has withstood direct application of live steam for 6 hours before showing any evidence of stress or strain.

In fademeter tests Varlar has withstood 48 hours of concentrated light rays, equivalent to six years of direct sunlight.

The result of nine years' research and experimentation by United Wallpaper, Inc., Varlar is now beginning to reach the market. The company also plans to manufacture several other stain- and grease-proof products now under development. Styled by top-name designers of the country in patterns and color effects of enchanting beauty, Varlar is, in the first place, thoroughly washable, even scrubbable. Washable, moreover, in a sense never before achieved by any wall covering to date. Any known kind of dirt or stain, with but one or two exceptions, can be washed off with soap and water.

But that is only the beginning.

Varlar is grease- and mildew-proof. In itself, Varlar is vermin-resistant. It is light-fast-, color-fast and odorless. The new wall covering is also fire-resistant and extremely tough. Salt spray cannot harm it, giving it a special value for ocean-going vessels and buildings located at shore points.

Laboratory Test Results

So much for a general summary of its miracle-working qualities. For concrete illustrations, take a look at the results of some specific tests.

Soap and water, applied in laboratory tests to Varlar-covered surfaces that were splattered with sizzling hot fats of different kinds, left the areas spotless. Cold fats, likewise, left no stain on Varlar when given soap and water treatment, nor did salad, lubricating, or castor oils, fresh or rancid butter, lard, peanut butter, vaseline, Unguentine, or furniture polish. Coming through these tests unspotted by a single failure, the new wall covering was then subjected to trials by various inks, pencils and crayons of red, blue, green and different combinations of these colors. Once again mere soap and water removed all marks with a nominal amount of rubbing.

Next, blots of catsup, mustard, steak, Worcestershire and chop suey sauces, mayonnaise, chocolate candy, cold creams, lipstick and similar substances were smeared on Varlar. Once again an application of soap and water removed all traces of the greasy, sticky stuff.

Hard-boiled stains such as those made by tea, flavoring extracts, various syrups, jams, jellies, salt water, mercurochrome, perfume, vinegar, blood, and meat juices, meekly gave up without a struggle when attacked by soap and water.

A few things—oil paints for one, black and ox blood shoe polishes for two

others—required light wiping with turpentine and then soap and water, but left no stain when so treated.

Real Life Tests

With the completion of the laboratory tests, Varlar was ready for the experimental debut into real life. So, for nearly two years, it has been tried out on the walls of eight private homes, six hotels, two hospitals, three restaurants, two office buildings, and a theatre. These include rooms in the Granada Theatre, Chicago; the Anthony Hotel and Radio Station WOWO, Fort Wayne; the Kimberley-Clark offices, Neenah, Wisconsin; the Netherland-Plaza Hotel, Cincinnati; Mount Alto Veterans Hospital, Washington, D. C.; a Thompson restaurant, Chicago; and a number of other public buildings, all coming through without a single stain on the paper's reputation.

Ideal for buildings in constant use by the public such as hotels, restaurants, night clubs, theatres, hospitals, schools and other intitutions, as well as trains, airplanes and steamships, Varlar will serve the individual consumer with equal success and adaptability in his own home.

Tests made by paperhangers have demonstrated that Varlar can be applied as easily as any other wall covering.

Granada Theatre Findings

That Varlar has been tried and proved entirely desirable in theatres is well attested by the experience of the Granada Theatre, one of Chicago's largest neighborhood cinemas.

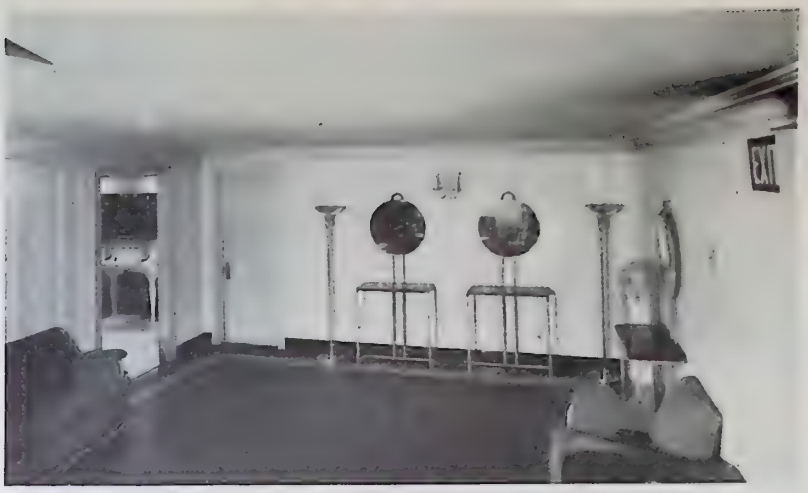
Varlar was put on the walls of the woman's lounge and the stairway leading to the lounge on December 7, 1944, over two years ago. It is still there and it looks the same today as it did when it was first put on.

The Varlar is washed all over at regular intervals, and individual spots or groups of stains are removed three or four times a week. Nothing is used but plain soap and water. It leaves the walls perfectly clean.

The principal stain encountered is lipstick—all kinds. Another frequent one is greasy hand marks, particularly on the stairway where Varlar is close to the hand rails.

The theatre reports that no matter what kind of lipstick gets on the walls, and no matter how long it is allowed to remain there, there is no difficulty in removing it with the usual soap-and-water method. Many of the spots occur on the seams of the Varlar, but that makes no difference, either, as the grease from the lipstick is not able to bleed out as is ordinarily the case.

The Varlar in the Granada is of a lace-stripe pattern, green on a yellow background, and it definitely adds to the decorative scheme. Incidentally, theatre owners and operators will be interested in knowing that Varlar will be available in 90 patterns — florals, geometrics, weaves, and the like—with practically no limit of the number of colors in each pattern. This will give a wide range of selection for adapting Varlar to any kind of decorative scheme.



THE GRANADA THEATRE, one of Chicago's largest neighborhood theatres, was the locale for a test of Varlar, the new stain-proof wall covering. Varlar was put on the walls of the powder room (top), the stairs leading to the lounge (middle), and the lounge itself (bottom) late in 1944. It is still there, and looks as good after more than two years as it did on that Pearl Harbor anniversary. The principal stain encountered is lip stick—all kinds!

THE VARLAR wall covering at the Granada Theatre is washed all over at regular intervals, individual spots or groups of stains are removed three or four times a week. Nothing is used but plain soap and water. It leaves the walls perfectly clean. The Varlar is of a lace-stripe pattern, green on a yellow background, definitely adding to the decorative scheme. The management reports that there is no difficulty in removing easily all the stains.

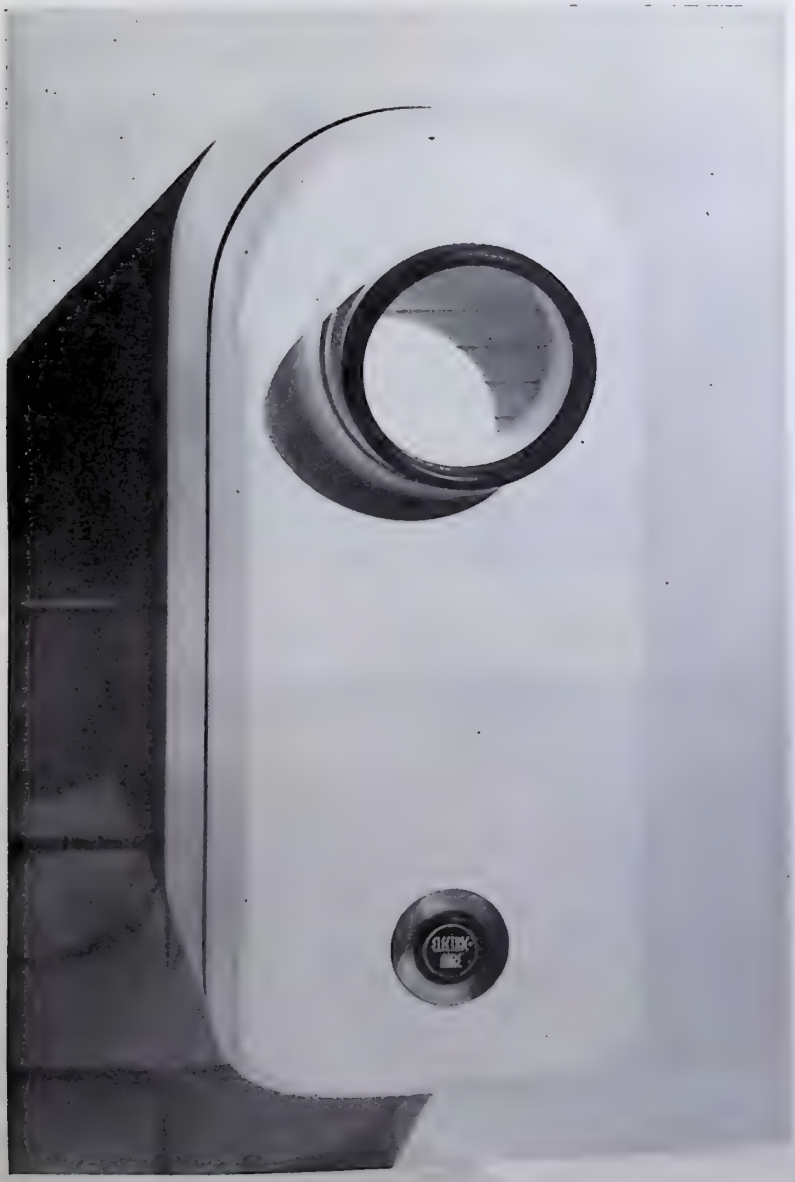
Theatre Washroom Sanitation and Safety

Advantages of New Electric Hand Dryers Set Forth as a Sound Theatre Investment

E. S. HEWITT
Executive Vice-President, Electric-Aire Engineering Corporation

The popularity of electric hand dryers among progressive theatre operators has gained tremendous impetus during the past few years. In theatres where electric dryers have been installed and in operation over a period of time their general success, reflected both by patron enthusiasm and by economy of service, is predicated upon their practicability and value in the up-to-date theatre. It will pay every theatre manager carefully to consider the possibilities of installing electric hand dryers as part of any modernization program which may be contemplated.

ELECTRIC HAND DRYERS can, as this model, be installed in toilet and wash rooms already built without too much trouble. Among the advantages of dryers are the enhancement of the appearance of washrooms, the elimination of a fire hazard, the making unnecessary the continuous service of a janitor or maid, a complete sanitary service, a continuous automatic drying service, the elimination of clogged plumbing, and long life with efficient service.



WASHROOM MODERNIZATION

There is perhaps no single phase of public establishment maintenance which is undergoing more thorough criticism by both the public and health departments all over the United States at present than this business of sanitation and safety. During the war years the public —eager for all kinds of amusement and recreation—were satisfied to put up with a great deal in the way of unsatisfactory (and, too often, downright unsafe) service. Health and fire departments were prone to excuse the operator in many instances because of the materials and labor situation.

Today, however, the pendulum of public and civic opinion is swinging rapidly in the opposite direction. Stringent regulations governing the elimination of fire hazards and unclean rest rooms are rapidly going into effect and being enforced in many communities.

Recent epidemics have had their share in focusing public attention upon the sanitation conditions in theatres. While it is true that washrooms constitute only one phase of this problem (adequate auditorium ventilation, heating, and the like are also in the picture), it is toward toilet facilities that most adverse criticism has been directed, and their improvement should be the first step in a sound modernization program.

WHAT CAN BE ACCOMPLISHED

Proper janitorial attention, the use of deodorants and air-conditioning, plus the repair and, wherever possible, replacement of worn-out or defective fixtures are all valuable and necessary steps in this program. However, all of these worth-while improvements are negated by patrons who throw paper towels on the floor. This patron practice of careless towel disposal is the bane of every theatre manager's existence. Besides creating a dangerous fire hazard, it results in an insanitary and messy washroom. Constant surveillance is impractical. What, then, is an effective and at the same time, economic solution?

EXPERIENCE OF ONE OPERATOR

Mr. H., manager of one of the largest theatres on the north shore of Chicago, decided early in 1940 that the installation of electric hand dryers might help solve his washroom headaches. The habit of patrons to use handfuls of paper towels and toilet tissues, which were subsequently dropped on the floor, was making his washrooms unsightly, insanitary and a subject of public criticism —besides running up his operation costs.

Mr. H. proceeded to install four electric dryer wall units at a cost of $500. They proved an immediate and continued success. Built to dry hands completely in 30 seconds, and greatly enhancing the appearance of his washroom, these hand dryers elicited much praise from his patrons. But that is not the whole story.

Mr. H. found that within 36 months dryers paid for themselves in the elimination of paper towel costs, and appear to be good for another ten years' use.

Here is the actual comparison:

Cost of Electric Dryers and Their Installation	$530.00
Paper Towel Expense Over 36 Month Period	531.00
Average 1-Month Current Expense to Operate Dryers	1.80
Average 1-Month Paper Towel Expense	14.75

Add to this the fact that the four electric hand dryers purchased by Mr. H. in 1940 are functioning perfectly today after over six years of constant heavy usage—and have gone without a single major repair or replacement—and you can readily understand why he congratulates himself for installing them.

Mr. H.'s success with electric hand dryers is only typical of the similar experiences of hundreds of other theatre managers.

ADVANTAGES OF HAND DRYERS

There are many outstanding advantages which the new electric hand dryers offer the theatre operator above and beyond sanitation and economy.

(1) **Enhance Modern Appearance of Washroom**—Electric hand dryers are streamlined and present an attractive, modern appearance. Encased in gleaming, white-enameled cabinets, they are easy to keep clean and shiny, and look well on any wall.

(2) **Eliminates a Dangerous Fire Hazard**—The very elimination of inflammable waste paper on the floors of washrooms through the use of electric hand dryers constitutes a positive safety precaution.

(3) **Continuous Service without Attention of Janitor or Maid**—Electric hand dryers make it unnecessary constantly to refill empty paper towel dispensers.

(4) **Complete Sanitary Service**—There is no way that contamination can be carried from one user to another, as is often the case with re-used roller or paper towels.

(5) **Continuous, Automatic Drying Service**—The operation of electric hand dryers is dependent only upon the efficiency of electricity.

(6) **Thorough Drying** — The use of electric hand dryers prevents chapping or roughening of hands. This feature is especially appreciated by patrons during cold weather.

(7) **Eliminates Clogged Plumbing**—Paper towels stuffed in drains and toilets cause needless plumbing expense.

(8) **Long Life of Efficient Service**—With ordinary regular care electric hand dryers will outlast the life of your building.

Put all of these advantages together and you will see why electric hand dryers are one of the soundest investments the progressive theatre manager can make.

BUILT-IN INSTALLATIONS can be made during the original erection of the theatre or any subsequent remodeling, as well, of course, as at anytime the owner cares to entail the modest extra charges for a better appearing washroom. These devices, easy to operate, and economical, can pay for themselves in as little as three years through the elimination of the expense of paper towels. Dryers tend to promote cleanliness on the part of patrons.

ELECTRIC-AIRE Hand Driers

For *Sanitation*—

The drying service provided by Electric-Aire is sanitary to a very high degree. Electric-Aire dries by evaporation, with a soothing current of warm air—there is nothing to harbor or carry germs or contamination from one user to another.

For *Safety*—

The dangerous fire-hazard of towels scattered about the washroom, is automatically eliminated, as Electric-Aire does away with the need for towels.

For *Service*—

Constantly dependable, the Electric-Aire supplies an uninterrupted service which is not dependent upon keeping towel-cabinets filled and soiled-towel receptacles emptied.

The Electric-Aire emphasizes the quality appearance of well-planned washrooms and aids to keep them clean and attractive.

THE DELUXE MODEL ELECTRIC-AIRE is suitable for any type of mounting—semi-recess, surface wall, or pedestal mounting. The above photograph shows the semi-recess type.

SEMI-RECESS TYPE

For the semi-recess type a rust-proof, pressed-iron box is provided for installation in the wall. An enameled cabinet containing the mechanism sets into the wall-box. Installation is easily made in any standard thickness, four-inch wall.

WALL-SURFACE TYPE

The surface wall type can be quickly mounted by the average house engineer or mechanic on any kind of wall construction. The ELECTRIC-AIRE is so designed that this type of installation can be mounted over the junction box or convenience outlet. Also the lower end of cabinet has a grommet insulated outlet for a cord connection where necessary.

PEDESTAL-MOUNTED TYPE

The pedestal-mounted type ELECTRIC-AIRE can be conveniently installed at any time in either old or new construction. In this type all anchor bolts are concealed within the pedestal, no rough surfaces or unsightly bolt heads are exposed to accumulate dirt or interfere with cleaning or mopping floors.

All ELECTRIC-AIRE hand dryers are equipped with automatic cut-off switches, whether push-button or foot operated. All switch mechanisms are designed to prevent "wedging" push-buttons and wasting current.

All mounting and assembly screws in ELECTRIC-AIRE hand dryers are concealed within the cabinet—only the two cover screws are exposed and they are safety screws removable only with a special driver provided for that purpose. The cover is easiiy removed by your service department for cleaning or oiling but it is tamper-proof against unauthorized removal.

The ELECTRIC-AIRE mechanism is cradled in the cabinet with a rubber-floated three-point suspension which eliminates all vibration. This and other patented noise-reducing features make ELECTRIC-AIRE exceptionally quiet in operation. All mechanism is completely insulated from the cabinet, eliminating all danger of shock.

An entirely new feature in the ELECTRIC-AIRE is the louver-covered nozzle which instantly opens when the dryer is in use and automatically closes when not in use. This is to prevent paper or any foreign substance being deposited in the nozzle.

ELECTRIC-AIRE, equipped with universal motor, operates with equally high efficiency on either alternating or direct, 110 volt current. Due to the great volume of air delivered by ELECTRIC-AIRE, it dries quickly and consumes a minimum amount of current, approximately one k.w.h. per 100 drying operations.

ELECTRIC-AIRE ENGINEERING CORP.

209 W. Jackson Boulevard • Suite 509-B • Chicago 6, Ill.

PROJECTION and SOUND
1946-47

Electronic-Control Projection Arc Lamp

Science Provides a Means of Arc Control That Provides Better Results on Screens

J. K. Elderkin
Forest Manufacturing Corporation

The production of maximum light and its proper distribution over the surface of the motion picture screen is, as all projectionists know, dependent upon the efficient functioning of every unit in the visual projection chain, whether mechanical or optical. Considering the fact that even the slightest variation in arc gap will occasion a radical change in the character of the projected image, it is obvious how interdependent are the various elements that constitute the projection process.

The great improvement wrought in projection optics during the past ten years, plus the impending change in the design of several well-known projectors which will enable the use of longer-diameter and more efficient lenses, constitute a major contribution to the solution of the crucial phase of the two-sided problem of enhancing the projected image.

But, mindful of the old adage that a chain is no stronger than its weakest link, it is obvious that better optics cannot alone effect sufficient improvement in the projection process to accomplish any substantial advance in the art. The mechanical phase must advance apace.

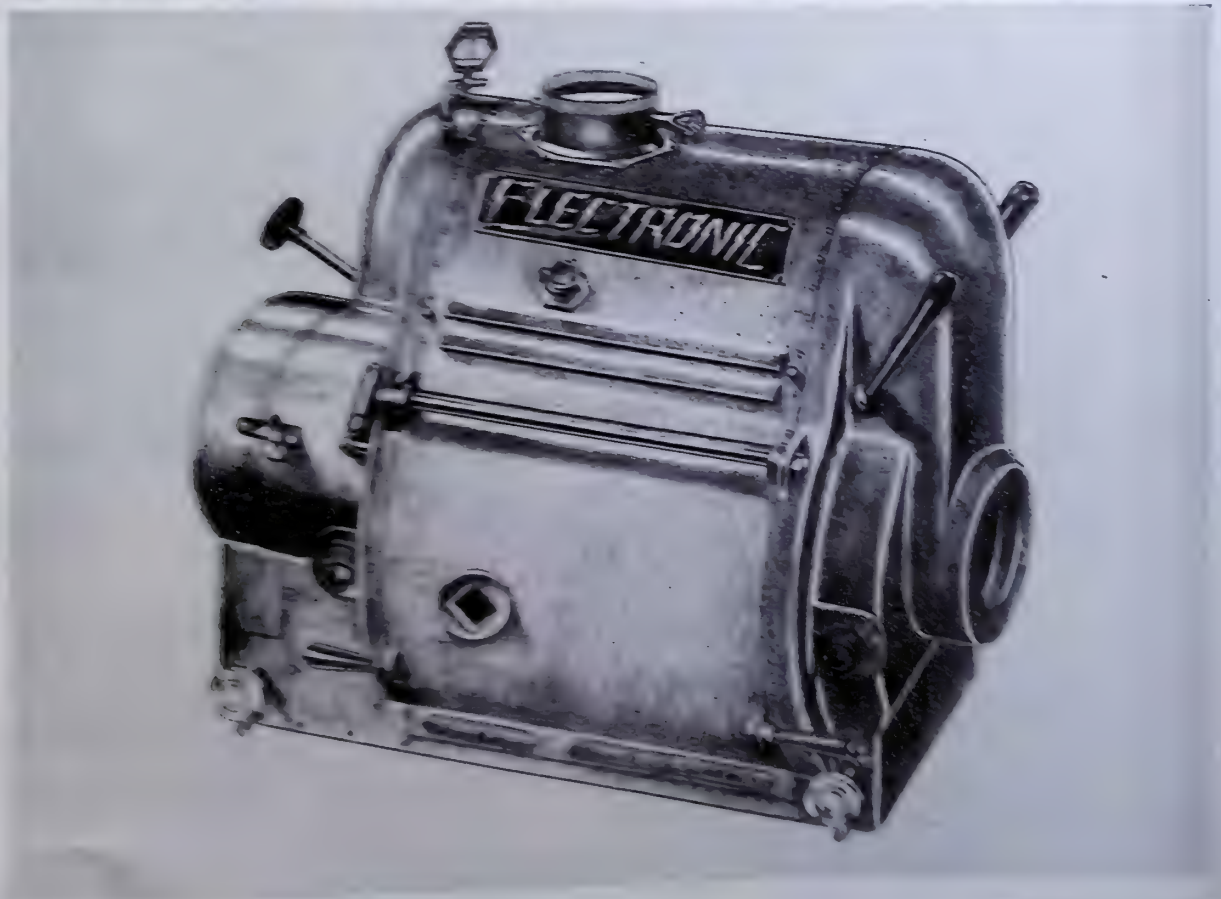
The present wholly mechanical system of feeding the positive and negative carbons in projection arc lamps is obsolete. Modern science, the benefactor of an accelerated wartime pace, has provided us with a means of arc control that is more accurate, more reliable therefore more productive of a better end result than any mechanical system that ever has been or likely can be devised—an electronic arc control.

PRESENT MECHANICAL FEEDS

The mechanical means presently employed for carbon arc feed in projection lamps consists of two feed screws, one driving the positive carbon carrier and the other driving the negative carbon carrier. These two feed screws are driven through gearing and clutches by a single motor and a speed-reduction gear.

Either a cam mechanism or a pawl-and-ratchet arrangement is provided to regulate the speed of the carbon feed. Carbon consumption depends upon the amperage at the arc. The ratio of carbon consumption varies with the amperage at the arc, thus it is of the utmost importance to utilize a system capable of precise carbon feed in order to maintain

The NOBLE ELECTRONIC CONTROL ARC LAMP corrects the faults inherent in present carbon feeds. Separate mechanisms for both positive and negative carbons are used. The driving motor is not affected by changes in the current. Each of the two mechanisms have independent driving motors so that individual speeds of travel may be regulated at will. Cams, clutches, gears, and all associated gadgets have been eliminated. The new control maintains the correct arc gap despite changes in current or voltage of the arc which naturally would affect a motor-driven feed. A varying feed, of course, results in poor screen light and presentation.



tain the proper focal point necessary for producing maximum light intensity.

THE ELECTRONIC FEED

Since present mechanical feed systems operate from a single driving source, it is impossible to maintain the carbons in correct focus for any appreciable period of time. If the positive carbon is feeding too fast and an adjustment is made to alter its speed, the speed of the negative carbon is affected. Very slight changes in current or voltage of the arc occasion a change in motor speed, thus causing the feed mechanism to run either too slow or too fast.

Maintaining the correct arc gap at present requires almost constant attention by the projectionist, and even then it is almost impossible with existing control systems to maintain the arc at its critical focal point.

Control Requisites

The correction of the inherent faults of present carbon arc feeds can be accomplished by satisfying the following requirements:

1. Separate mechanisms for both positive and negative carbon feeds, completely divorced from each other.
2. The driving means must be one the operating speed of which will not be affected by changes of the current supplying same.
3. Each of the feed mechanisms, positive and negative, must have an independent driving means so that their individual speeds of travel may be regulated at will.
4. The elimination of cams, clutches, gears and all associated gadgets.

A mechanism reflecting considerable research and ingenuity has been developed which successfully meets the aforementioned requirements. The Forest electronic arc control operates in the following manner.

The Positive Feed

The positive carbon feeding unit consists of two slide rods which support the carbon carrier, and a worm screw suitably attached to the carbon carrier in such a manner that when the screw is rotated the carrier is fed toward the negative carbon. The slide rods and the worm screw are supported in the usual manner by end plates or bearings.

The feed screw protrudes through the end of one of these supports and has secured directly to it a rachet gear. This gear is rotated by a co-acting pawl actuated by a solenoid magnet in such a manner that each time the plunger of the solenoid moves in a forward direction the pawl turns the ratchet gear a predetermined distance.

For instance, in the case of a ratchet gear having 30 teeth and a solenoid to rotate it at the rate of one tooth for each solenoid movement, it is apparent that 30 solenoid strokes per minute will revolve the worm screw one revolution per minute. Therefore, if the worm screw has, say, 8 threads to the inch, the carbon carrier will be moved forward ⅛ inch. It follows, then, that 60 solenoid strokes a minute will move the carbon carriage forward ¼ inch a minute.

It will readily be seen that by the proper selection of worm screw pitch and ratchet gear teeth, in conjunction with the number of electronic impulses supplied to the solenoid coil, any feeding speed desired may be obtained. There remains, therefore, only the need to supply sufficient electrical impulses to the solenoid to drive the mechanism at the desired speed.

Impulse Generator

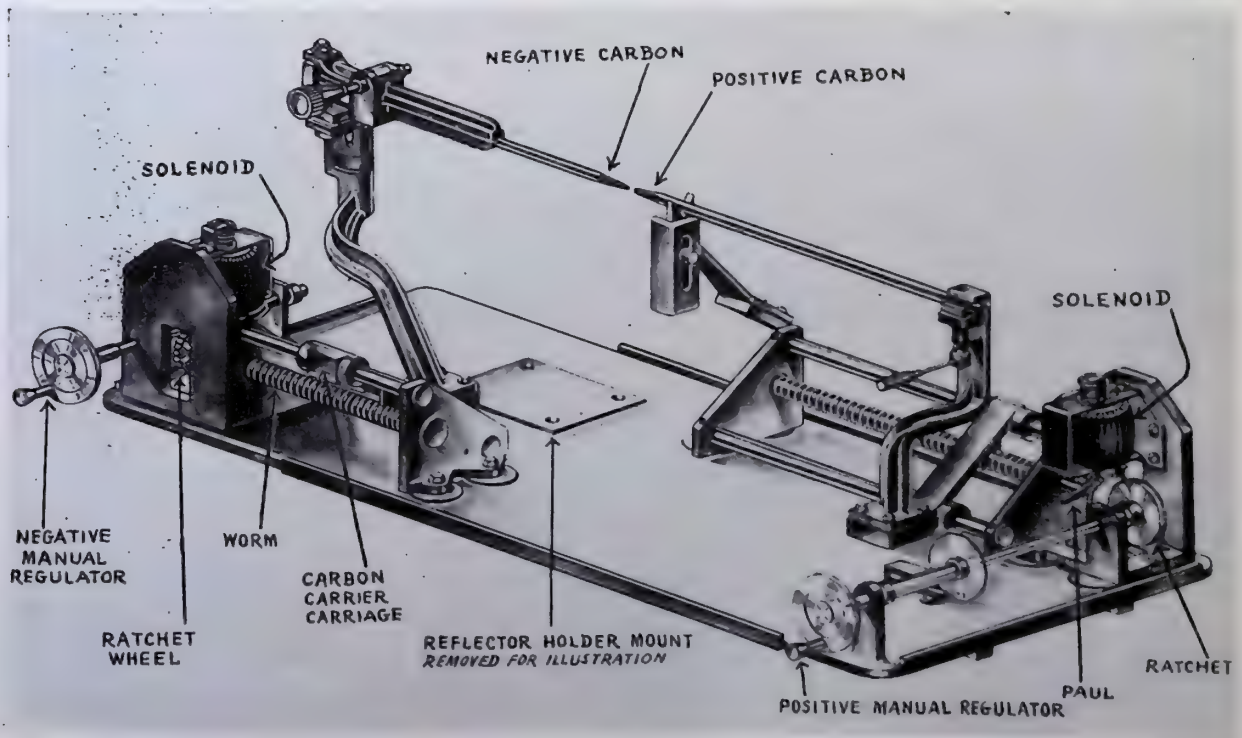
An electronic device was designed whereby the regular 11-volt a.c. supply line is converted into impulses which are fed to the solenoid coil. The device, an electronic impulse generator, is extremely simple and compact and has but a single control knob with which to vary the number of impulses supplied from 20 to 120 a minute—a speed range for the feed mechanism which is much lower and much higher than is ever required.

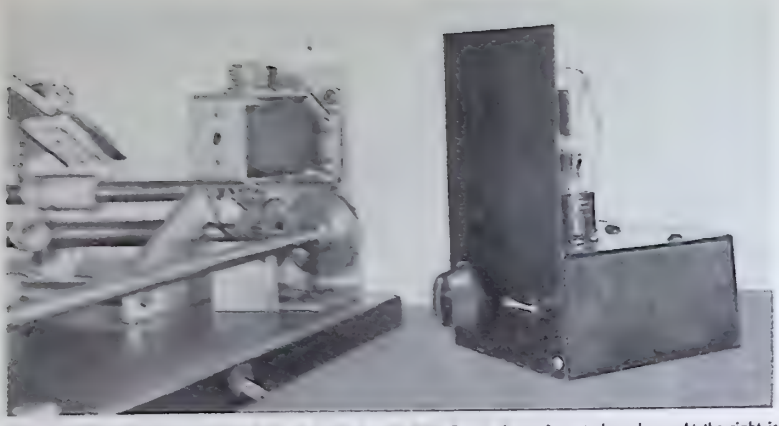
Production of impulses by the electronic control is regulated as accurately as is an electric clock. A graduated dial at the control knob is marked for amperage so that the feeding speed can be set at the exact point required by the arc current. A very slight adjustment of this knob will regulate the feed exactly to suit a given condition; that is, as the arc current varies slightly the control may be set to the average condition and will thereafter maintain the arc at the exact focal point.

The Negative Feed

The negative feed mechanism is exactly the same as the positive mechan-

THE INSIDE OF THE NEW FOREST LAMP, stripped of housing, reflector mounting, and other items which confuse the view, reveals the simple mechanism. At the left is the negative carbon, with its associated solenoid, worm, carbon-carrier carriage, and the manual regulator. At the right is the positive, with its associated solenoid, ratchet, pawl, and manual regulator. The electronic control, which is the outstanding feature of this new lamp, has already been demonstrated in the stripped-down form to many engineers, manufacturers, projectionists, and theatre men. The lamp employs two electronic timers, built in such a way as to permit easy replacement.





CLOSE-UP VIEW of the ratchet wheel, pawl, and solenoid of the Forest electronic-control arc lamp. At the right is seen the electronic generator that supplies impulses to the solenoid. The positive carbon feeding unit consists of two-side rods and a worm screw. The feed screw protrudes through the end of the support and has a ratchet gear secured directly to it. The gear is rotated by a co-acting pawl, which is actuated by a special solenoid.

[illegible] with a separate electronic impulse generator controlling the speed of the negative feed. There being no mechanical or electrical tieup between the positive and the negative feeds, each feed may be adjusted wholly independent of the other, and any size or any combination of carbons may be used.

This Forest electronic system utilizes no reduction gears, no clutches and no fast-moving parts, thus reducing frictional wear to a minimum. If the carbon holders are fed up to their extreme limit, they merely stop without occasioning any injury whatsoever to the mechanism. A manual control for both positive and negative feed mechanism is brought out on the side of the lamp.

The electronic arc control which is the outstanding feature of this new lamp has already been demonstrated in strictly-down form to scores of engineers, manufacturers and projectionists.

Electronic Timer Data

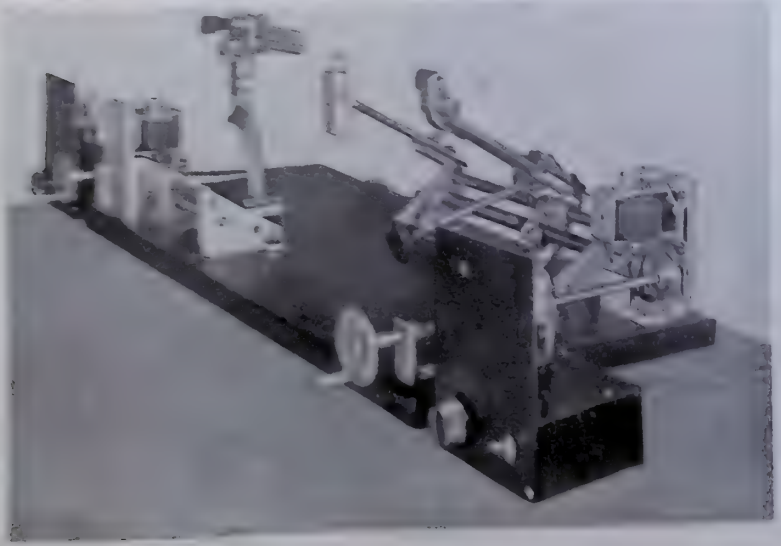
The new Forest electronic projection lamp, as described in the above paragraphs, is actuated and driven by solenoids instead of the usual motor.

In order for the solenoids to impart rotary motion to the worm screw, which feeds the carbons, it is necessary to feed the solenoid with impulses of electrical energy.

As is well known, a solenoid works on the principle that when it is energized the core will move in one direction until the current is cut off and then the plunger will return to its normal position. Therefore, in order to obtain intermittent motion, it is necessary to energize the solenoid and then deenergize the same so that the plunger will move up and down at a speed dependent upon the number of impulses per minute fed to the solenoid coil.

A device for producing these impulses

STRIPPED-DOWN VIEW of the Forest electronic-control lamp base, showing the positive and negative mechanisms and the two electronic generators, one at each end of the base. The reflector and its base have been removed to show the mechanism more clearly. The electronic generators are fitted into the back of the lamp, shown here detached for illustrative purposes only. The positive and negative control knobs are conveniently placed.



tronic timer. The circuit used in this timer is new and patents are pending covering same.

The Forest electronic timer employs a small thyrathron tube in circuit with condensers and resistors in such manner has been developed and is called an elec- that the time current flows through the device and the time that no current flows through the device can be regulated at will by simply increasing or decreasing the amount of resistance in the control circuit. By simply turning the knob of the variable resistor clockwise or counter-clockwise, the number of impulses from the timer will be increased or decreased so that the speed of the lamp feed mechanism can be perfectly and accurately controlled to feed the carbon forward at the exact rate of its consumption.

The dial of the variable control is graduated in arc amperage and type of carbon so that it can be readily set to the proper point for the arc current being utilized in that lamp. A slight further adjustment of this control knob will then maintain the feed at its proper speed and no further change is necessary unless the arc current or the size of carbons is changed.

The principle involved in the electronic timer is as follows:

(1) Plate current flows through a resistor and through the load. The potential difference across this resistor is fed to a condenser through a second resistor.

(2) The potential across the said condenser builds up gradually and is fed to a second condenser through a third resistor.

(3) The potential across a second condenser builds up gradually and reaches the critical grid voltage of the tube and causes the plate current through the load to cease flowing.

(4) The potential across the condensers is gradually discharged through the resistors and thus the control grid potential is reduced to the point where the plate current will again flow through the load starting a new cycle.

(5) As the frequency of operation is dependent upon the speed at which the potential across the condenser changes, the timing may be controlled by proper selection of a variation of resistors.

This electronic timer used with the projection lamp is so designed by use of proper resistors and capacity so that a wide range of adjustment is possible. The lower setting gives a timing too low for feeding any of the present carbon trims and its upper limit gives a timing too fast for feeding any of the present carbons.

The intermittent steps between the two extremes are fine enough that exact timing for any carbon consumption can be obtained.

The Forest electronic projection lamp employs two electronic timers, one for the positive feed and one for the negative feed and they are built into the lamp in such a manner that they are removable as easily as removing a tube from its socket.

The life of the thyrathron tube and the associated parts of the timer is extremely long and since the lamp itself has no fast moving parts, the combination makes a true feeding trouble free and extremely simple projection lamp.

Report on the New Concentrated-Arc Lamp

Many Possibilities Seen for the New Arc That Approximates Point-Source of Light

W. D. Buckingham and C. R. Deibert
Engineering Department of the Electronics Division, The Western Union Telegraph Company

During the war a new type of light source was developed under a contract issued through the Optics Division of the National Defense Research Committee. The new lamp, called the concentrated-arc lamp, is basically a direct-current arc lamp made with permanent, fixed electrodes which are sealed into a glass bulb filled with an inert gas. The name, "concentrated-arc," comes from a characteristic of the lamp which makes it possible to concentrate the arc activity upon a small portion of the electrode so as to produce a very high intensity light source in the form of a luminous circular spot which is fixed in position, sharply defined and uniformly brilliant.

The degree to which this concentration may be carried is illustrated by the 2-watt concentrated-arc lamp whose luminous spot is only 0.003 of an inch in diameter with a maximum brightness of 100 candles per sq. mm. Ordinary tungsten filament lamps operate at about 10 candles per square millimeter while the brightness of the crater of a carbon arc lamp is about 135 candles per square millimeter. The area of the spot formed increases with the current so that a 100-watt lamp has a spot 0.059 of an inch in diameter, while the spot of a 1500-watt lamp is 0.35 inch in diameter.

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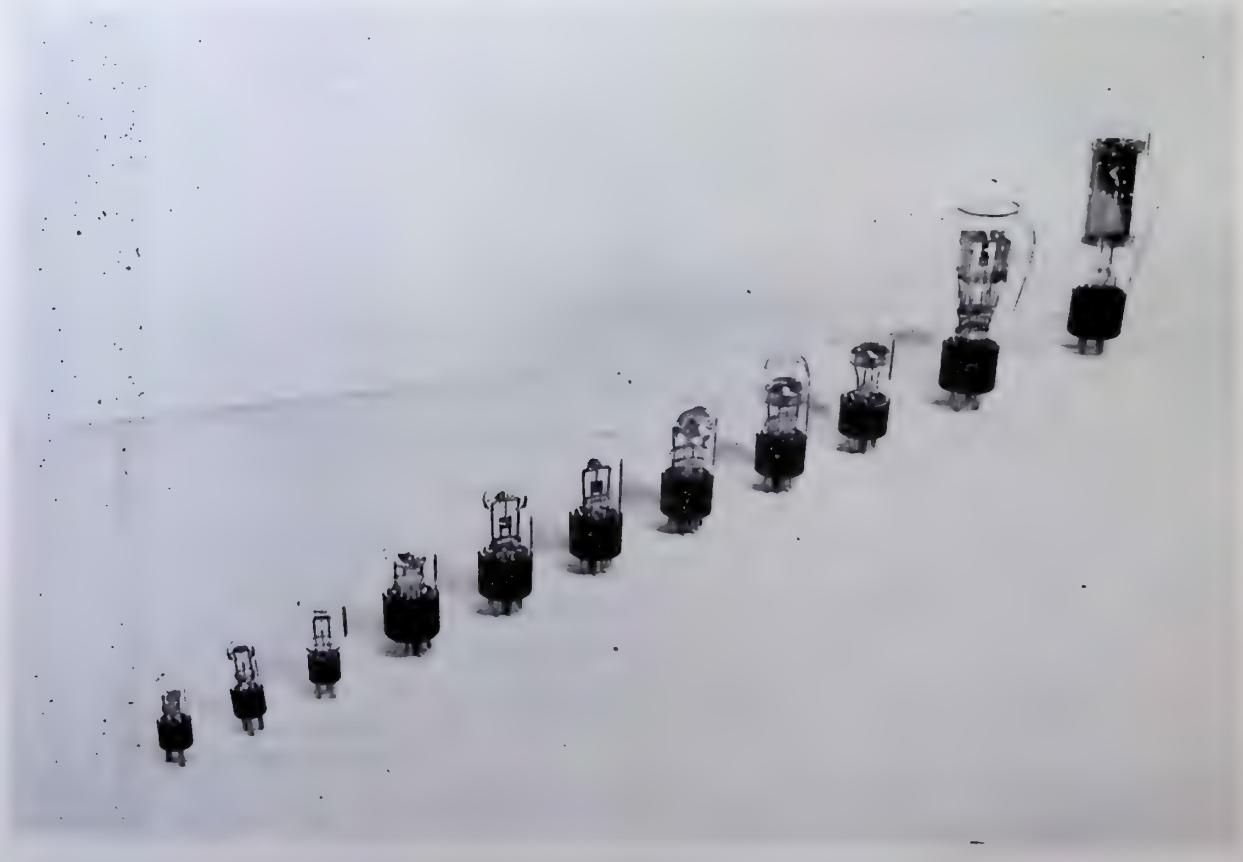
The source of the light is an incandescent spot which forms on the specially prepared negative electrode or cathode. This cathode is the unique element of the new lamp. It is made by packing zirconium oxide into a small cup or the open end of a tube which is made of tungsten, molybdenum, or tantalum, these metals being selected because of their high melting temperatures.

The positive electrode or anode, also made of a metal with a high melting point, consists of a simple sheet or plate which has sufficient radiating surface so that during operation it will reach no more than a dull red heat.

These two electrodes are mounted in the bulb so that the exposed oxide surface of the cathode is but a few hundredths of an inch from and directly behind a hole in the center of the anode.

FIGURE 1—A line of standard-size concentrated-arc lamps has been developed in sizes from 2 to 100 watts. Larger lamps are made, but the designs have not been standardized. The lamp is basically a direct-current arc lamp, made with permanent, fixed electrodes which are sealed into a glass bulb filled with an inert gas. The name, "concentrated-arc," comes from a characteristic of the lamp which makes it possible to concentrate the arc activity upon a small portion of the electrode, so as to produce a very high intensity light source in the form of a luminous circular spot in a fixed position, sharply defined, and uniformly brilliant.



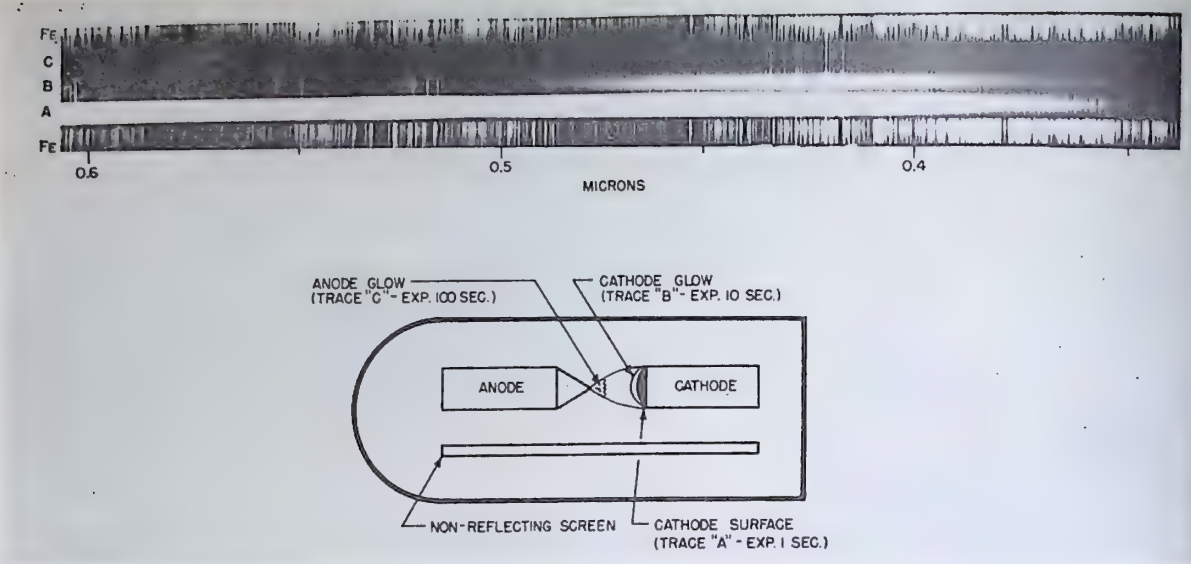


FIGURE 2—Spectrogram of various regions of a concentrated-arc lamp and a diagram of the source of the various spectra. The spectral distribution characteristic represents the combination or sum of the several spectra from the sources indicated in the drawing: the anode glow, the cathode glow, and the cathode surface. Radiation shorter than 3,000 A or longer than 5 microns is not transmitted by the type of glass used for the bulbs of standard-type lamps. The molten, incandescent cathode surface, or cathode spot, furnished the greatest amount of radiation from the arc. It is probably thermal radiation the surface-bound atoms and molecules.

This hole is slightly larger in diameter than the cathode tube or cup and provides a window for the emergence of light from the cathode.

After the bulb has been evacuated, it is filled with an inert gas, usually argon, to almost atmospheric pressure. The cathode is then put through a "forming" process. To do this a high potential direct-current source, with suitable current limiting resistors in series, is connected to the electrodes so that an arc strikes between the anode and the metallic tube of the cathode. After a few seconds, the cathode tube becomes red hot and heats the zirconium oxide packed in it to a temperature where the oxide becomes electrically conductive. The arc then strikes between the anode and the oxide and ionic bombardment raises the temperature of the surface of the oxide to or above its melting point of 3,000 degrees K. The molten oxide flows and bonds itself to the sides of the metal tube forming a smooth glassy surface.

The exact mechanism of the next phase of the forming sequence is not fully understood but it is thought that in the molten state and under the intense ionic bombardment of the arc, some of the zirconium oxide is reduced to metallic zirconium. The zirconium atoms form a thin surface layer in equilibrium with the molten oxide. The released oxygen migrates to the anode which always shows signs of oxidation.

Zirconium metal is apparently a better electron emitter at high temperatures than is the oxide and it also has a lower melting temperature; thus as soon as the zirconium surface layer is formed the temperature of the cathode drops slightly and the underlying oxide solidifies and supports the thin film of molten metal on its surface. It is this film of molten metal which is the chief source of the visible radiation from the lamps. The film, once formed during manufacture, remains to be heated and become incandescent whenever the lamp is relighted. It is so thin that surface tension holds it to the oxide backing so the lamps may be burned in any position.

Spectrograms of the portion of the arc stream very near the cathode always show zirconium lines. This indicates that some evaporation of free zirconium occurs. Very little zirconium is lost however since positive zirconium ions are produced by electron bombardment and are driven back to the cathode. If any metal atoms do escape from the cathode, they are replaced by reduction of the underlying oxide. As a result of these processes, the lamps have lives which are measured in hundreds of hours.

The cathode-current densities in the concentrated-arc lamp vary from about 250 amperes per square centimeter for the 100-watt lamp to about 900 amperes per square centimeter for the 2-watt lamp. Assuming the electron emitter to be the thin zirconium layer at a temperature slightly below 3,000 degrees K, the melting point of the oxide, and using the constants commonly given for a zirconium filament in a vacuum, values of electron emission are obtained which are of the order of 500 amperes per square centimeter. This value is entirely in line with the actual current densities found in the lamps and seems to confirm the present belief that the arc is maintained entirely by thermionic emission, and that the active surface of the cathode consists of a thin layer of zirconium atoms at a temperature considerably above the normal melting point of the bulk metal.

The radiation from the concentrated-arc lamp appears to be divided into three

FIGURE 3—Spectral distribution of radiation from a 100-watt concentrated-arc lamp. The distribution characteristic represents the combination or sum of the lamp's several individual spectra from various regions.

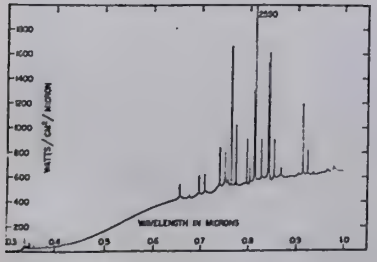


FIGURE 4—Change of light source diameter with current of concentrated-arc lamp. The diameter of the light source varies from 0.05 to 3.5 mm, as the lamp currents are changed in the several standard sizes.

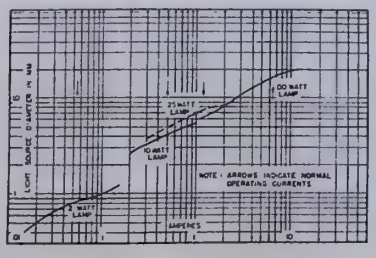
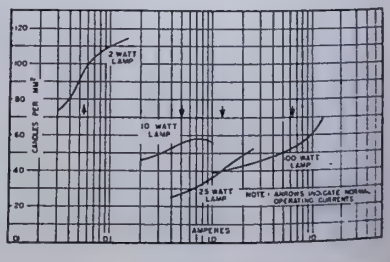


FIGURE 5—Change of maximum brightness with current of concentrated-arc lamp. The maximum brightness of standard lamps under normal operation varies 40 and 100 candles to the square millimeter.



parts as follows: (1) Continuous radiation from the molten cathode surface, (2) line radiation from the excited gas and vapor, and (3) continuous radiation in the spectral region from at least 3500A to 5000A originating in the excited gas and vapor.

The existence of the three types of radiation is shown by the spectrograms in Figure 2. The three exposures were made from the cathode spot, cathode glow, and anode glow portions of the arc of a specially constructed 100-watt lamp. The cathode spot is by far the brightest portion. Even though the exposure times for the three traces varied in the ratio of 1:10:100, it is found that the trace of the cathode spot area is more than ten times as intense as that of the cathode glow area.

Thus the molten incandescent cathode surface or cathode spot furnishes the greatest amount of radiation from the arc. It is, in all probability, thermal radiation from the bound molecules and atoms present in the surface. The spectral distribution of this radiation is essentially that of a gray body.

The characteristic radiation of the rare gas filling and the zirconium vapor comes from the arc stream and in particular from the cathode glow region.

Spectrograms of 100-watt concentrated-arcs in argon show lines of excited and singly ionized argon and zirconium atoms and doubly ionized zirconium atoms (AI, ZrI, AII, ZrII, and ZrIII). The excited argon, AI, and the singly ionized zirconium, ZrII, atomic lines are the strongest and most numerous, only a few very weak AII and ZrIII lines appearing.

The continuum shown in the spectrogram of the cathode glow region seems to have its origin in this dense cloud of argon gas and zirconium ions which is very close to the molten cathode surface. Since special precautions were taken in constructing the lamp to make sure that scattered or reflected light from the molten cathode surface could not enter the spectrograph when the cathode glow was used as the source of radiation, it seems quite certain that this continuum has a different origin than that of the cathode spot.

Thus concentrated-arc lamps emit radiation from two main sources, the white hot zirconium cathode surface and the cloud of excited zirconium vapor and argon gas extending for a few thousandths of an inch from the cathode. The portion which originates from the cathode surface has a continuous spectral distribution. It extends in measurable amounts from 2500A in the ultraviolet, through the visible, reaching a maximum near 10,000A and on into the infra-red. That portion of the radiation which comes from the cloud of excited vapor and gas shows three principal spectra, a continuum extending from the ultraviolet to about 5000A, the normal, singly and doubly ionized zirconium spectrum and the normal and singly ionized argon spectrum.

The spectral distribution characteristic shown in Figure 3 thus represents the combination or sum of these several individual spectra. Radiation shorter than 3000A or longer than 5 microns is not transmitted by the type of glass used for the bulbs of standard type lamps.

A line of standard size lamps has been developed in sizes ranging from 2 to 100 watts. Pictures of these lamps are shown in Figure 1. Larger lamps are made but designs have not been standardized.

The diameter of the cathode spot of a given lamp depends upon the current. If the current is increased, the spot slowly grows larger, taking several seconds to adjust itself to the new condition. Figure 4 shows how the diameter of the light sources vary from 0.05 mm. to 3.5 mm. as the lamp currents are changed in the several standard sizes of lamps. While the lamps are designed to operate at a definite current value, it is possible to adjust the spot size by changing the current. The upper limit of this process is reached when the spot completely covers the activated zirconium oxide surface. If the current is increased further, the spot becomes brighter but not larger and the life of the lamp is shortened. When the current is very much less than normal, the spot becomes variable in size and position and the lamp is unstable.

One of the advantages of the concentrated arc is its high brightness. As shown by Figure 5, the maximum brightness of standard lamps at their normal operating current varies between 40 and 100 candles per square millimeter.

To the eye, the cathode spot appears to have a uniform and constant brilliance. Measurements show that the brightest part is near the center. The average brightness variation across the spot, for the several sizes of lamps, is shown in Figure 6. Variations in the position taken by the arc stream and irregularities in the cathode surface may produce an unsymmetrical and changing brightness distribution. Also, the spot position my shift slowly during operation by an amount equal to a small percentage of its own diameter. These factors combine to produce variations of about ten percent in brightness and total emitted light.

The candlepower increases with the current, maintaining an almost linear relationship over a very wide range as shown by the curves of Figure 7.

The efficiency of concentrated-arc lamps, as measured in candlepower per watt input to the lamp, varies between 0.15 for the 2-watt lamp to 0.8 for the 100-watt lamp. This characteristic is shown in Figure 8. Comparable figures for tungsten filament lamps range from 0.54 for a 6-watt lamp to 1.29 for 100-watt lamps.

The spatial light distribution curve of Figure 9 plots the light about the axis of the cathode and shows that concentrated-arc lamps have a cosine distribution.

The average changes in the major characteristics of a group of twenty-five 10-watt lamps during aging is shown by the curves of Figure 10. These show that during the first few hours of running the candlepower and light spot diameter will decrease while the maximum brilliance increases. After about 100 hours of operation, these characteristics become reasonably stable around 80 per cent of the initial candlepower, 75 per cent of the initial light spot diameter, and 140 per cent of the initial brilliance.

The mortality curve of Figure 11 shows the average life of 2-watt lamps to be 175 hours. Similar data on larger lamps give 700, 800, and 1,000 hours on 10-, 25-, and 100-watt lamps although individual lamps have shown lives up to 5,000 hours. Failure is usually caused by loss or shrinkage of the cathode-filling material.

Concentrated-arc lamps have a negative volt-ampere characteristic as is shown by the curves of Figure 12. Consideration must be given this fact in the design of their power supplies.

The lamps are started with a high

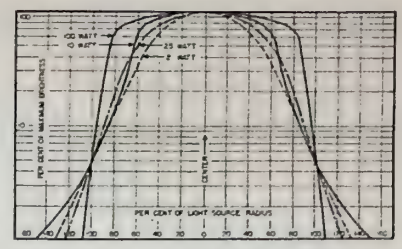


FIGURE 6—Average cathode brightness distribution of concentrated-arc lamp. To the eye, the cathode spot appears to have a uniform and constant brilliance. The brightest part, however, is near the center.

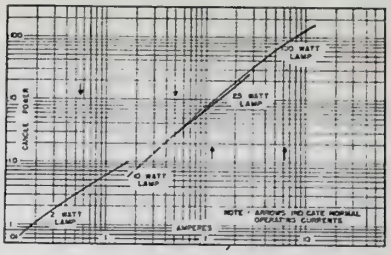


FIGURE 7—Change of candlepower with current of concentrated-arc lamps. The candlepower increases with the current, maintaining an almost linear relationship over a wide range as shown in the graphs.

FIGURE 8—Change of efficiency with current of concentrated-arc lamp. The efficiency, as measured in candlepower per watt input, varies between 0.15 for the 2-watt lamp to 0.8 for the 100-watt size of lamp.

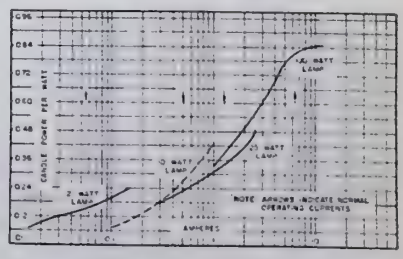
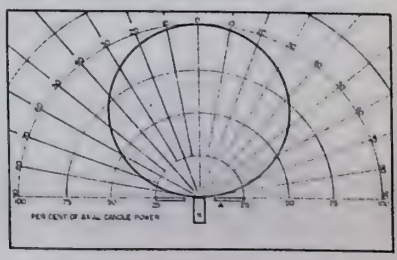


FIGURE 9—Spatial distribution of radiation of concentrated-arc lamps. This spatial light distribution curve plots the light about the axis of the cathode, showing a typical cosine relation in the distribution.



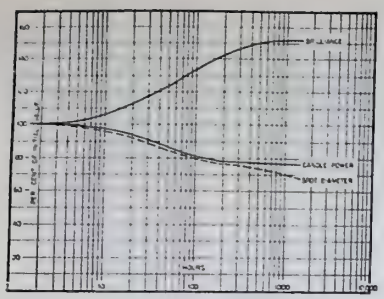


FIGURE 10—Change of characteristics with age of concentrated-arc lamps. The average changes of 25 10-watt lamps show that candlepower and light spot diameter decrease, the maximum brilliance increases.

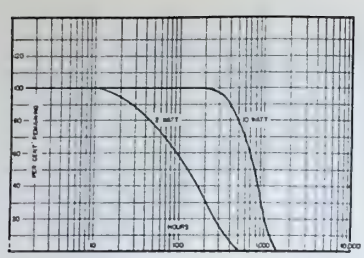


FIGURE 11—Mortality curves for 2- and 4-watt concentrated-arc lamps. The average life of 2-watt lamps is 175 hours. Other data gives 700, 800, and 1,000 hours, respectively, for 10-, 25-, and 100-watt lamps.

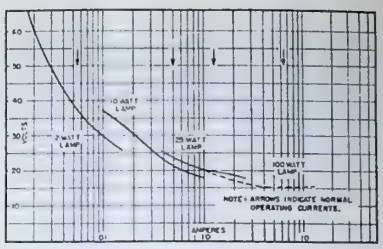


FIGURE 12—Volt-ampere characteristics of concentrated-arc lamps. These lamps have a negative volt-ampere characteristic. Due consideration must be given to this fact in the design of power supplies.

voltage which breaks down the gap in the lamps. They are usually run from a rectifier or direct-current generator or battery with sufficient ballast resistance in series to limit the current to its normal value. Some lamps have been made with multiple anodes which permit their operation from an alternating current supply, in which case the lamps act as their own rectifiers.

Two-watt lamps require 1,000 volts for starting and 130 volts or more for running. Larger lamps need up to 2,000 volts for starting and may be run from sources supplying from 24 volts up, higher supply voltages resulting in more stable operation. The a.c. type of lamps are frequently started without the use of high voltages by the aid of an auxiliary tungsten filament which is built into these lamps to furnish the initial ionization required to break down the gap and establish the arc.

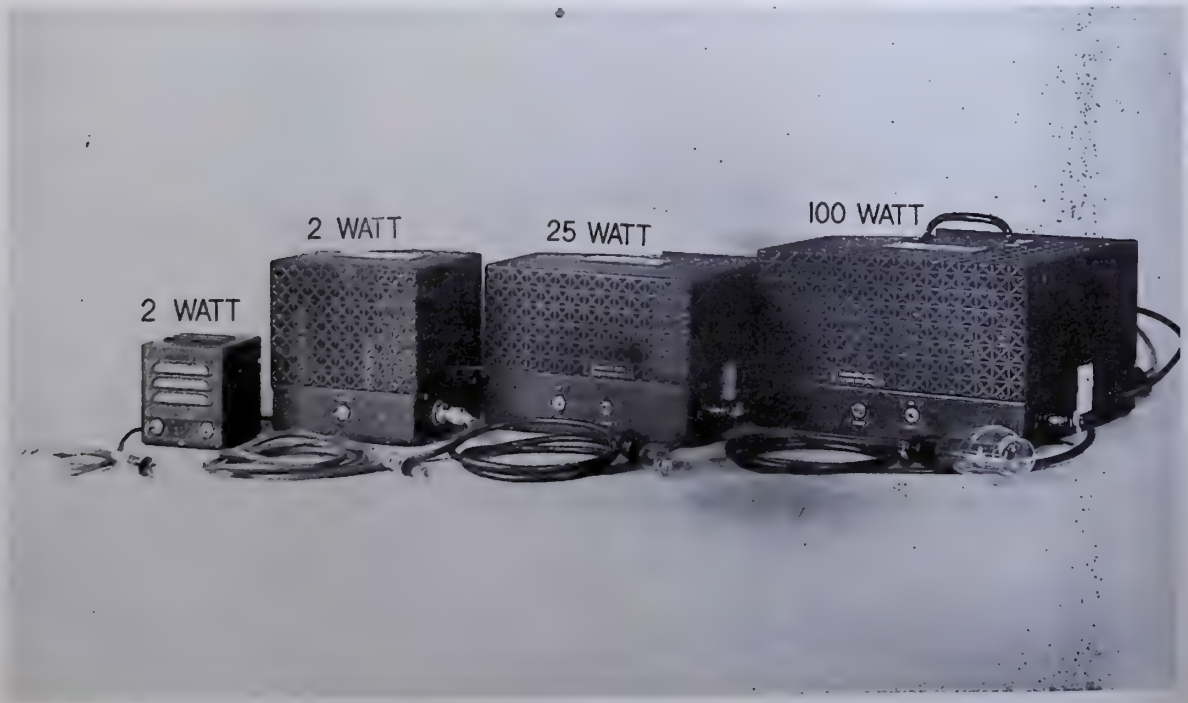
Power supplies, such as shown in Figure 13, can be designed to operate from almost any power source and deliver the necessary starting and running voltages for any size lamp.

The concentrated arc is therefore a new type of lamp which offers a unique combination of properties. The source of the radiation is a circular spot which is fixed in position, sharply defined, and unformly brilliant. It is very bright, being several times brighter than tungsten filament lamps and almost as bright as the carbon arc. The source may be as small as 0.003 inch or as large as several tenths of an inch. The principle radiation is emitted as a continuum which extends well into the ultraviolet and infra-red. The lamps start almost instantly and burn quietly without need of attention or adjustment. They may be burned in any position, are reasonably rugged and have lives which are measured in hundreds of hours. These properties make the concentrated-arc lamp useful for narrow beam and high intensity projection and illumination applications. It may also be used to furnish a high intensity continuum for absorption studies. In small sizes, the lamps are a close approach to a point source and have applications in optical testing and demonstrating, lensless projection and enlargement, photography, and in many entirely new devices which a brilliant point source will make possible.

Acknowledgment

The writers wish to express their appreciation to the members of Section 16.4 of the N.D.R.C., particularly Dr. O. S. Duffendack and Dr. Saul Dushman, also to Dr. W. S. Huxford, of Northwestern University, and Dr. H. L. Smith, of Michigan State Normal College, for their suggestions, help, and assistance in the development of this lamp.

FIGURE 13—Power supplies can be designed to operate from almost any power source and deliver the necessary starting and running voltages for any size lamp. Shown here are power supplies for 2- (two styles), 25-, and 100-watt concentrated-arc lamps. The lamps are started with a high voltage which breaks down the gap in the lamps. They are usually run from a rectifier or direct-current generator or battery with sufficient ballast resistance in series to limit the current to its normal value. Some lamps have been made with multiple anodes to permit operation from an alternating-current supply, the lamps, accordingly, acting as their own rectifiers.



Technical Data on Motiograph's Model AA

A New Post-War Projector Takes Its Bows As the Eighth in the Company's 50 Years

EMIL J. WEINKE
Chief Design Engineer, Motiograph

The new Model AA is the eighth to be produced by Motiograph, and comes fittingly enough on the golden anniversary of the founding of the company. Motiograph was established originally by Alvah C. Roebuck, co-founder of the Sears Roebuck Company, in 1896, and is the oldest manufacturer of motion picture equipment in the field. During these 50 years it has pioneered in turning out projection and sound equipment which has set the pace for better performance and higher standards.

In order that theatre owners, projectionists, and motion-picture engineers may have a good idea of the outstanding advantages which the AA incorporates, the present object is to present some of the technical details which go to make up this post-war projector.

Let us first briefly review the basic principles which motivated the design of the Model AA. As a preliminary step, an extensive survey was conducted to determine the design features desired by projectionists and exhibitors. This included a careful study and testing of all present and earlier models of projectors, as well as considerable research to uncover such design features as might advantageously be included.

The underlying thought in regard to the AA was that it must be a mechanism of completely new design rather than simply a revision of earlier Motiograph projectors. The designers were thus unhampered by traditions and customs, except in the matter of mounting and drive arrangements, and were free to use improved materials, finishes, and processes which were derived from war work, including Motiograph's own work in producing precision machined components and major assemblies for ordnance equipment.

There were a number of factors that entered into the work of design. It was determined first of all to produce a projector that would achieve the best possible picture on the screen as regards steadiness and clarity. The projector would also have to give exceptionally long life, and yet be economically manufactured. Lastly, it was required that it be simple to operate and have little requirement for replacements and repair.

How well these objectives have been achieved will become evident in the detailed description.

THE PROJECTOR HOUSING

To provide for accurate alignment of components and maximum stability in operation, the housing of the Motiograph AA is a one-piece casting enclosing all the working parts of the mechanism, including the twin rotor double rear shutter. The large cast door, hinged at the front, provides access to the interior of the film compartment for threading, and its double windows permit the upper and lower film loops to be readily observed during operation. A tubular extension of the main frame casting supports the lens carriage with exceptional rigidity. The drive gear compartment on the drive side of the mechanism is equipped with a dustproof cast cover firmly held in place by Allen cap screws. This construction is made possible by the fact that little access to the drive side is required, and thus harmful dirt and grit are kept out of the working components of the machine. (Figures 1, 2, and 3.)

Most of the working parts are supported by the reinforced center frame, which is an integral part of the housing casting. It stiffens the housing, and provides the rigid and stable supporting means for the film drive components and for the optical elements required for minimum machine vibration and maximum steadiness in the projected picture. The entire housing is quite large by former standards, being 15 inches high, 11 inches deep, and 18 inches long. The weight is not cumbersome, however, for

FIGURE 1—Projector Mechanism, front view. The new Model AA is the eighth to be produced by the company and comes on the golden anniversary of the founding of the company. There were a number of factors that entered into the work of design, to give long life, economical manufacture, easy to operate, and have little requirement for replacements and repair. How well the model achieves its purposes is shown in these pictures and drawings.

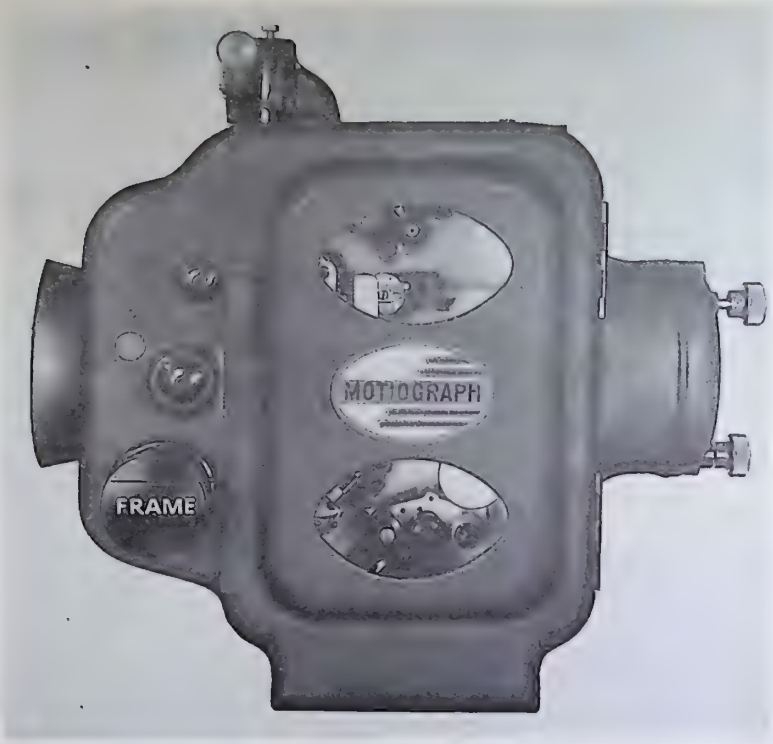
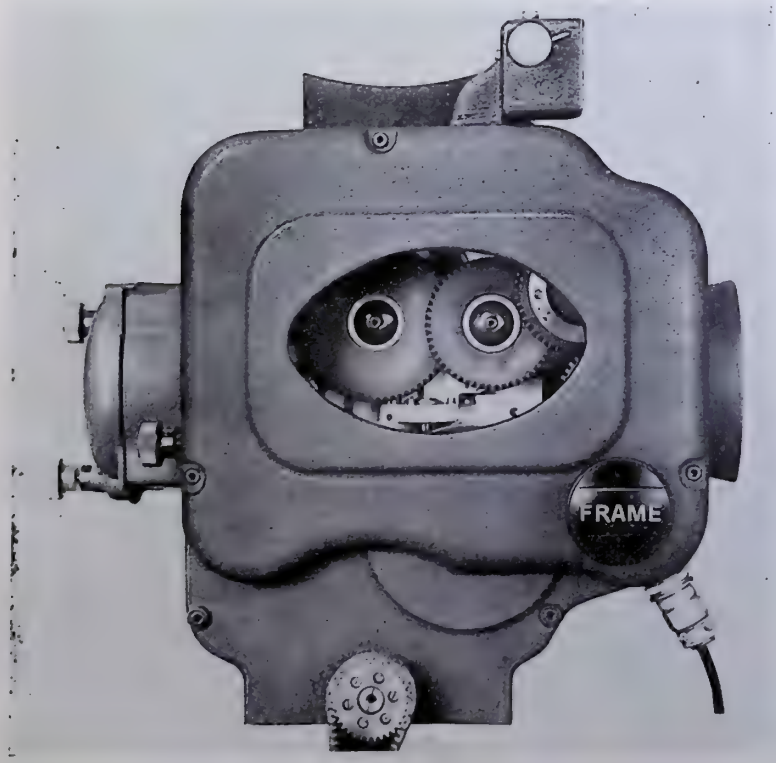


FIGURE 2—Projector mechanism, operating side. To provide for accurate alignment of components and maximum stability in operation, the housing is a one-piece casting, enclosing all working parts including the twin rotor double rear shutter. The large cast door, hinged at the front, provides access to the interior of the film compartment for threading, and its double windows permit the upper and lower film loops to be readily observable.

FIGURE 3—Projector mechanism, drive side. A tubular extension of the main frame casting supports the lens carriage with exceptional rigidity. The drive gear compartment on the drive side is equipped with a dust-proof cast cover firmly held in place by Allen cap screws. This construction is made possible by the fact that little access to the drive side is required, and thus harmful dirt and grit are kept out of the working components.



all of the major castings are made of light but strong aluminum alloy. The housing corners are rounded and its contours are smooth. The general appearance conforms to accepted concepts of modern streamlined design while preserving functional efficiency.

CONSTRUCTION OF MECHANISM

The Motiograph AA projector is of unit construction, with all major components easily removable for inspection, cleaning or servicing without the necessity for disassembling the machine. In the drive gearing, this has been accomplished by the virtual elimination of long shafts carrying numerous gears. Power is transmitted to the various film drive points by hardened steel gears meshing smoothly into laminated bakelite gears. The gears run on grease-packed double-row ball bearings which are rigidly supported by studs locked into the mechanism center frame. The gear meshes require no lubrication other than an original film of lubricant as long as they are kept clean, for experience indicates that gear wear results primarily from the lapping action caused by dirt and grit brought in by frequent hand oiling or by poorly filtered lubrication systems of the continuous or distributed type.

This is brought out in the diagram of a typical gear assembly (Figure 4). Item 6 is the supporting stud which is locked in place in the center frame by the screw, Item 4. Item 7 is the double-row, sealed ball bearing which supports the Item 5 gear assembly. These bearings are the lubricated-for-life type, and almost indefinite wear may be expected. The bearings are held in place on the gear hubs by the snap rings, Item 1. The gear and bearing assemblies are locked securely to their mounting studs by the reinforced decorative dust caps, Item 3, and the Allen cap screws, Item 2.

Figure 5 shows the simple and rugged gear train of the AA projector. Power from the drive shaft at the bottom of the mechanism is transmitted by gear combinations to the ball-bearing supported vertical shaft just back of the intermittent movement flywheel. This shaft passes through and is keyed to a wide, movable pinion which meshes with the drive pinion on the intermittent movement cam shaft, thus permitting the movement to be shifted vertically for picture framing. Furthermore, the position of the wide pinion with respect to its mating pinion on the movement is adjustable to provide a continuously variable shutter timing control which may be operated with the projector running. Since this control moves with the intermittent carriage, it is extended to the front of the mechanism housing by means of a flexible shaft.

Both the upper and lower feed sprockets of the projector are driven by stub shafts carrying on their drive ends suitable gears to mesh into the main gear train at the required points. The lower such shaft is just above the main drive shaft, and it also carries the drive gear for the vertical shaft. The gear on the upper is above the upper large bakelite idler gear. This idler and those to the right of it transmit power to the shafts carrying the shutter rotors and to the shaft of the blower and fire shutter actuator.

The main drive of the AA projector is made in the form of a socket shaft into which the soundhead drive unit may be clamped in order to eliminate the need for oiling of the sound reproducer's projector drive assembly, and to provide a more rugged construction at this critical point. Referring to the Figure 6, the tubular shaft and socket unit, Item 1, runs in the sealed ball bearing, Item 3, and in a similar bearing set into the center frame of the mechanism. The Item 3 bearing is seated in an auxiliary rib of the main housing by easily operated clamps, so that the entire drive unit may be quickly and simply removed or replaced in operating position. The soundhead's drive unit is locked into the socket shaft by the set screws, Item 2 and 5, and the heavy-duty pinion, Item 4, is fixed on the tubular shaft by the Item 6 key. The large end of the shaft is provided with a belt groove for driving lower magazine takeups when the projector is operated with certain older sound reproducers having no takeup drive facilities of their own. This drive construction eliminates the possibility of damage to projector gears due to poor alignment between the projector and soundhead. There are no long sleeve bearings to bind from inadequate lubrication, and since the drive shaft requires no additional lubrication during the long life of its sealed ball bearings, the risk of damage to soundhead optical components from excessive oiling and oil leakage is eliminated.

THE FILM PATH

The exceptional roominess of the AA provides for threading simplicity. The film enters the projector (Figure 7) from the upper magazine through a fire trap unit having four quenching rollers running on grease lubricated pivot bearings. Between both upper and lower rollers there is a long chute to aid in the quenching action. From the fire trap the film passes to the upper feed sprocket, upon which it is held in place by the combined action of the sprocket's pad roller and the hardened steel guide roller just above and to the right of the sprocket. The film is thus guided smoothly over the sprocket, which engages six full perforations, and there is thus no tendency for it to jerk or slap because of uneven hold-back tension from the magazine. This increases film life over that from the conventional four tooth engagement.

The film loops upward from the upper feed sprocket, and then passes down through the gate to the intermittent sprocket, around which it passes in a clockwise direction to form the lower film loop. For best alignment and for proper engagement of the sprocket and film, the tension shoe assembly is made part of the intermittent unit itself. The leaving end of the lower film loop passes over the lower feed sprocket clockwise and the film then travels downward to the sound reproducer. Double pad rollers on this sprocket insure sufficient engagement between sprocket teeth and film perforations to block the pulsating film travel produced by the intermittent movement. The film is fed smoothly to the reproducer and the film motion stabilizing system thus does not have to cope with

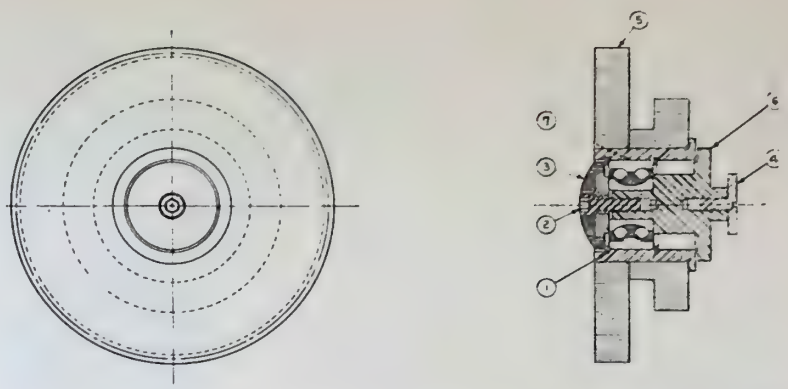
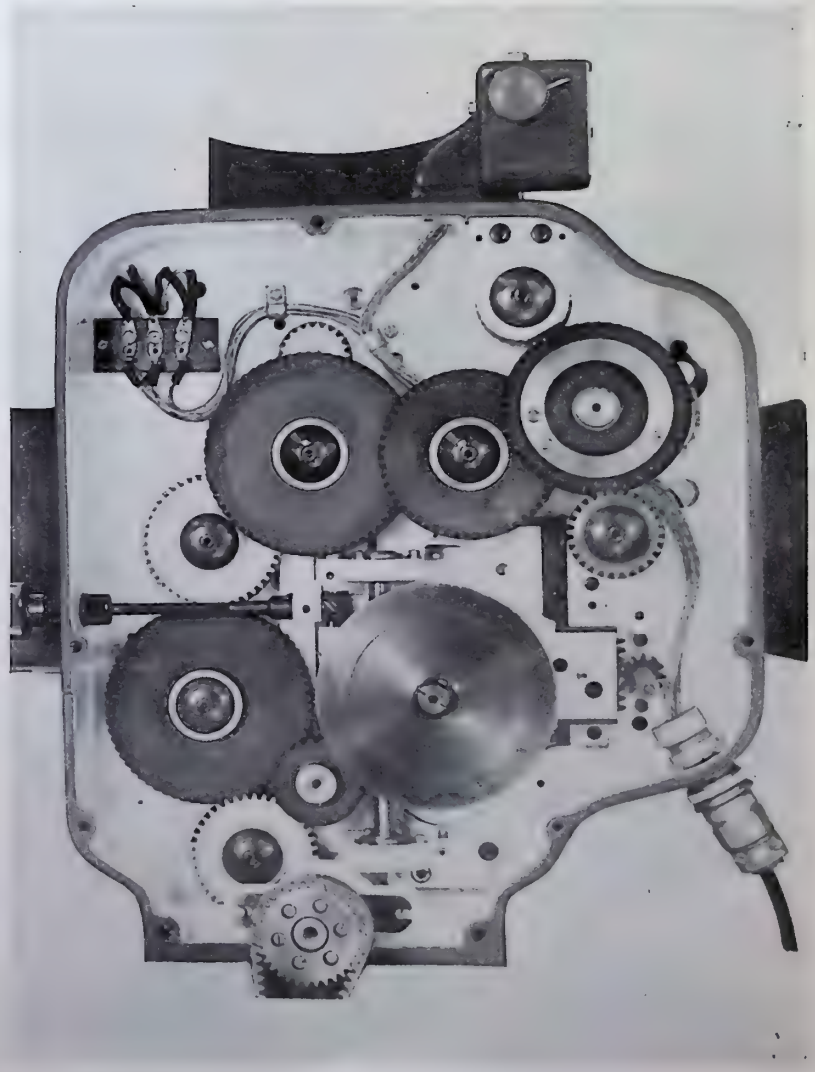


FIGURE 4—Typical Gear Assembly. Item 6 is the supporting stud which is locked in place in the center frame by the screw, Item 4. Item 7 is the double-row, sealed ball bearing, which supports Item 5, gear assembly. The bearings are held in place in the gear hubs by the snap rings, Item 1. The gear and bearing assemblies are locked securely to their mounting studs by the reinforced, decorative dust caps, Item 3, and cap screws, Item 2.

FIGURE 5—Projector mechanism, drive side, cover removed. Shown is the simple and rugged gear train. Power from the drive shaft at the bottom of the mechanism is transmitted by gear combinations to the ball-bearing supported vertical shaft just back of the intermittent movement flywheel. This shaft passes through and is keyed to a wide, movable pinion which meshes with the drive pinion of the cam shaft of the intermittent movement.



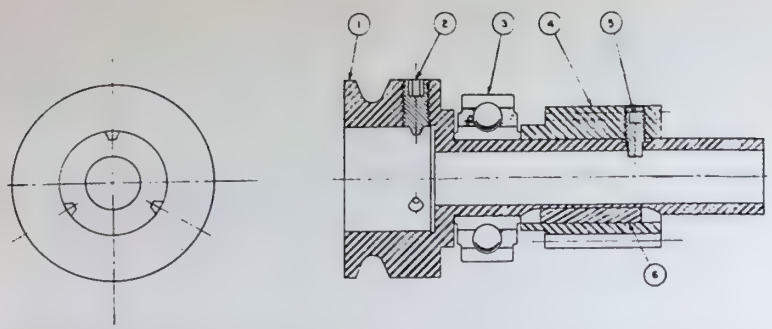
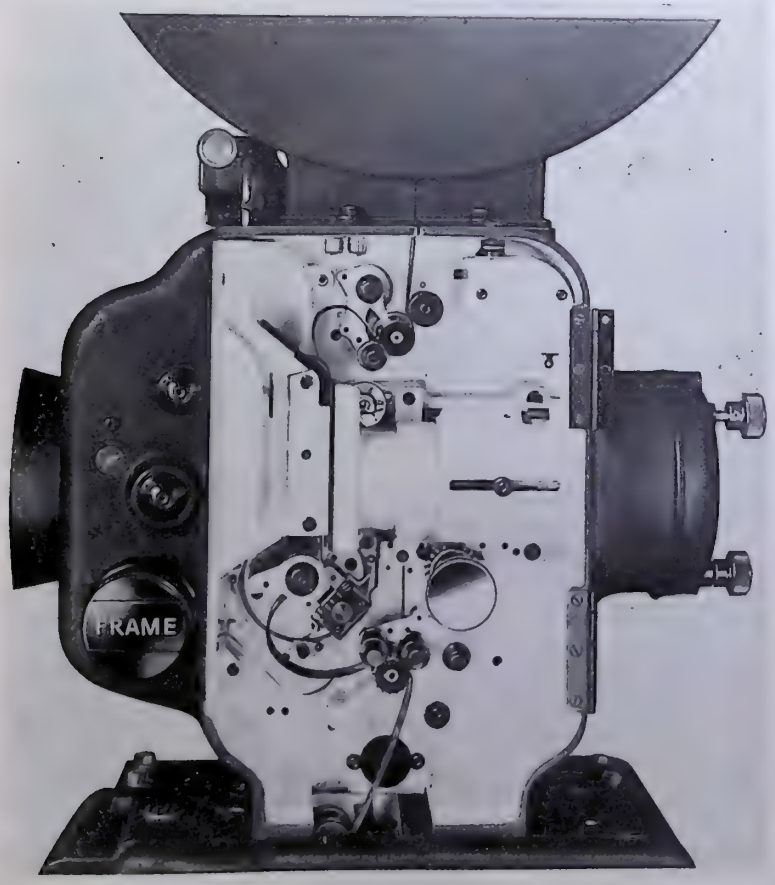


FIGURE 6—Drive shaft. The tubular shaft and socket unit, Item 1, runs in the sealed ball bearing, Item 3, and in a similar bearing set into the center frame of the mechanism. The Item 3 bearing is seated in an auxiliary rib of the main housing by easily operated clamps, so that the entire drive unit may be quickly and simply removed or replaced in operating position. The sound head's drive unit is locked into the drive shaft, Items 2 and 5.

the irregularities produced by the intermittent action. Better reproduced sound quality inevitably results.

A distinguishing feature is that the film path below and to the right of the lower feed sprocket is completely clear of all obstructions, with the exception of the cast stripper for this sprocket. This allows plenty of space in this region for the possible eventual addition of such auxiliary equipment as double film attachment and control track pickup facilities. For the former, the stripper mounting boss is so located and designed as to permit the substitution of another double pad roller assembly for the stripper, so the bottom of the feed sprocket may be used to feed the separate sound track film to the sound reproducer, with the picture film going across the top of the sprocket and thence by an external chute to the picture film takeup magazine. There is likewise adequate clearance below the feed sprocket to accommodate the feed and guide rollers of a new double film type of sound reproducer requiring no external chute and no projector modifications.

FIGURE 7—Operating side, showing film path. Door removed. The exceptional roominess of Model AA provides for threading simplicity. The film enters the projector from the upper magazine through a fire-trap unit having four quenching rollers running on grease-lubricated pivot bearings. Between both upper and lower rollers, there is a long chute to aid in the quenching action. From the trap, the film passes through to the upper feed sprocket.



THE FILM GATE

It will be noted that the film gate (Figure 8) of the AA, when opened forward, provides a full inch clearance between tracks and tension shoes, thus allowing really adequate finger room for threading and for routine cleaning of aperture, tracks, shoes and guide rollers. The two long film tension shoes extend the full length of the film tracks, and for perfect alignment they are combined into a single rigid unit of hardened steel. The film contacting surfaces are ground and polished. This unit is held to the gate assembly by studs at the top and bottom which engage a unique gunlock mechanism within the gate body. The studs snap into operating position as they enter their locating slots in the gate body face. They are instantly released by pulling out a small plunger near the top of the gate body. The shoe unit is therefore removable for routine cleaning almost as easily as the film itself, and there is no chance for disturbance of either the alignment or of the tension adjustment.

Operation of the film gate is by a rack and pinion type control device just below the lens barrel. A quarter turn of its large control knob opens the gate, and another version of the gunlock mechanism within the control shaft automatically locks the gate open as the knob is released. The gate closes and locks closed by simply pressing inward on this same knob to release the first locking device.

The diagrammatic view of the gate assembly (Figure 9) shows additional details. Item 1 is the base casting. This casting has an extension at the left to support the track and aperture unit, Item 2, while the gate body moves in long V-rails on the steel balls indicated as Item 5. These same V-rails also support and guide the lens carriage. It is obvious, therefore, that all components concerned in the relationship between the film plane and the lens optical axis are part of a single major assembly which may be aligned with the utmost precision.

The spring, Item 6, automatically closes the gate when the operating control catch is released. Item 4 is a fixed light guard casting which covers the end of the projection lens nearest the film plane to prevent stray light leakage at this location. Item 3 is the tension shoe unit proper. Shoe tension is applied by the semi-circular projections visible between the shoe runners and the gate body. These are at the ends of two transverse pressure bars within the body. Variable pressure is applied to the centers of these bars by flat springs on a vertical shaft whose mounting screws are visible at the top and bottom of the gate body. The degree of tension is determined by the cam-type tension control, Item 9. The pressure applied to the shoe unit in the "standard" position of this control is approximately 350 grams, and this value is satisfactory when films in average commercial condition are being run. The "low" position of the control reduces the pressure to about 225 grams to accommodate new, green film, and the "high" position increases the tension to around 675 grams to aid in flattening badly buckled older films. The control setting may be changed with the projector in operation.

FILM TRACKS AND APERTURE

The diagram of the track assembly (Figure 10) shows how the track support casting is fastened to the base of the gate and lens carriage unit. After accurate alignment with the optical axis is made, the casting is dowelled in place on the base so that it may be taken off and replaced without disturbing the alignment. The track and aperture unit is very accurately machined, and can be replaced after long use with full assurance that the optical alignment will not be impaired.

The tracks and aperture of the AA are combined into one sturdily constructed unit of hardened and ground steel. This unit is Item 7. It is drawn securely against the support casting, Item 4, by the engagement between an anchoring stud on its rear surface and a long cone-point, socket head set screw, Item 8. The unit is thus very easily removable for inspection and cleaning without disturbing other projector components.

The lateral guiding of the film over the tracks is accomplished by the two guide roller assemblies, Items 2 and 6. Each has a fixed flange, or roller half, for the sound track side of the film and a movable flange under small spring tension for the opposite side, to accommodate films having various degrees of shrinkage without producing film buckling or failure of the guiding action. The roller assemblies are relatively close to the aperture opening and are much more effective in eliminating film sidesway than non-rotating fixed types of lateral guides. The rollers are large in diameter so as to derive sufficient turning torque from the moving film, and are fabricated from very tough and thoroughly hardened steel alloy to resist wear. They turn freely on hardened pivot-type bearings lubricated internally through small openings in the tips from grease reservoirs within the bodies of the bearings.

THE INTERMITTENT MOVEMENT

The intermittent movement (Figure 11) has well been called the heart of the projector mechanism. Exhaustive tests were made with many different types of movements, including some which were provided with complex gearing and auxiliary cams to decrease the pull-down time. While it was finally determined that the movement of the Model AA should be basically of the conventional 90 degree Geneva type, it nevertheless incorporates numerous original design features.

The tension shoe assembly for holding the film in place on the sprocket is mounted directly on the movement case. Outboard ball bearings for both the sprocket, or star shaft, and for the cam shaft are provided. The movement case design and the mounting arrangements in the projector are such as to permit the entire movement to be quickly and easily removed from the operating side of the machine without disturbing any other components except the movement balance wheel. The cam shaft is directly driven from the main projector gear train, and carries on its outboard end a balance wheel of sufficient diameter and weight to have adequate inertia to effectively equalize the pulsating torque requirements of the intermittent action.

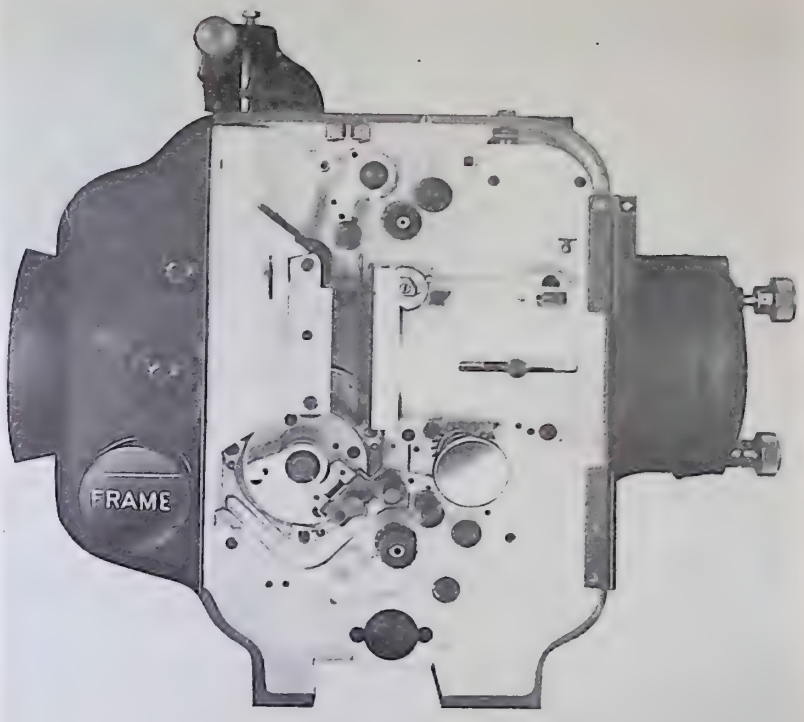
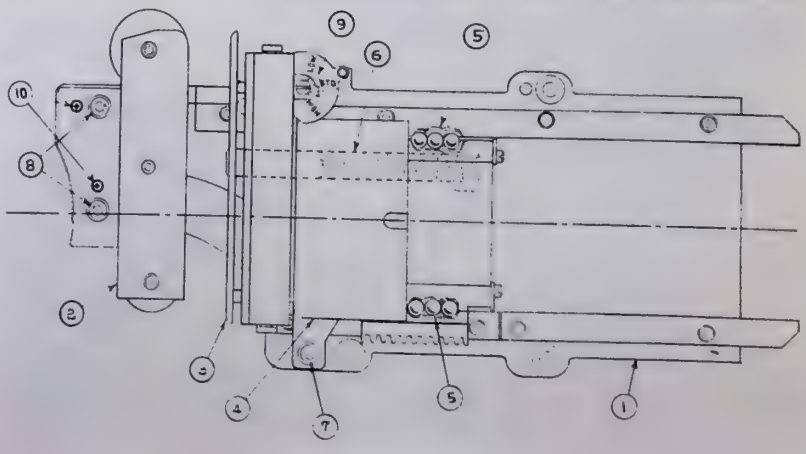


FIGURE 8—Operating side, film gate open. The film gate when opened provides a full inch clearance between tracks and tension shoes, thus allowing for adequate finger room for threading and routine cleaning of aperture, tracks, shoes, and guide rollers. Two long film tension shoes extend the full length of the film tracks, and for perfect alignment they are combined into a single rigid unit of hardened steel. Film contacting surfaces are ground.

The various sectional diagrams in Figure 12 show the intermittent movement and its components. Item 2 in Section AA is the balance wheel, locked firmly to the cam shaft by the cone-head, socket-type set screw, Item 1. Next in line from left to right is the cam shaft collar, Item 21. This is threaded to the shaft and can be locked in any particular position by the set screw and plug, Items 3 and 4. It provides means for

FIGURE 9—Gate assembly. Item 1 is the base casting. This casting has an extension to the left to support the track and aperture unit, Item 2, while the gate body moves in long V-rails on the steel balls, Item 5. The spring, Item 6, automatically closes the gate when the operating control catch is released. Item 4 is a fixed light guard casting which covers the end of the projection lens nearest the film plane to prevent stray light leakage.



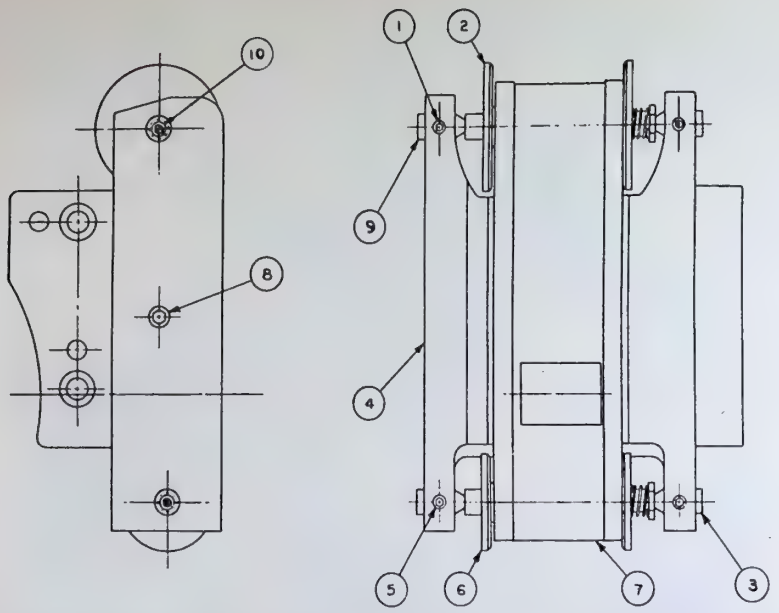
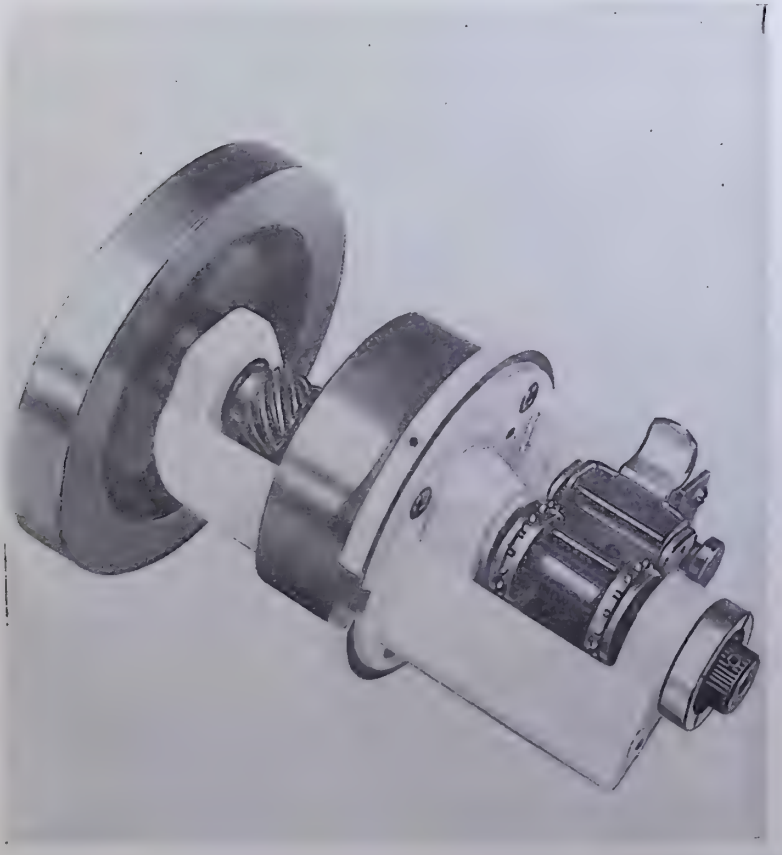


FIGURE 10—Track assembly. The tracks and aperture are combined into one unit of hardened and ground steel, Item 7. It is drawn securely against the support casting, Item 4, by the engagement between an anchoring stud on its rear surface and a long cone point, socket head set screw, Item 8. The lateral guiding of the film is accomplished by two roller assemblies, Items 2 and 6. Each has a fixed flange for the sound track side.

FIGURE 11—The intermittent movement is of the Geneva type. The tension shoe assembly for holding the film in place on the sprocket is mounted directly on the movement case. Outboard ball bearings for both the sprocket, or star shaft, and for the cam shaft are provided. The movement case design and mounting arrangements in the projector are such as to permit the entire movement to be quickly and easily removed from the operating side.



loading the ball bearings to the exact degree necessary to remove all end and radial play while still permitting the shaft to turn freely with no danger of binding or freezing.

Shown next in Section AA is the heavy-duty drive pinion, Item 6, followed by a soft metal grease seal and the inner bearing. The two major movement housing castings, Items 20 and 17, are held firmly together, with the Item 33 gasket between, by the four socket head cap screws, Item 26 (Section A). Holes for these screws in Item 17 are somewhat larger than the screw diameters, and Item 17 is movably pinned to Item 20 at a point just to the right of the upper screw hole shown in Section CC. The two set screws, D and E, set into the rim of Item 17, bear against pins fixed in Item 20 and extending into clearance holes in Item 17. It is thus possible accurately to adjust the clearance between the cam ring and star radius surfaces by means of the screws D and E after slightly loosening the main fastening screws, Item 26. The cam and star run in semi-fluid grease inserted through the filler plug, Item 7, to the level of the dashed line in Section AA.

The star shaft bearing and grease seal construction is similar to that of the cam shaft, with Item 13 being the threaded, locking collar to take up end and radial play in the bearings. A movable indicator cap, Item 15, is provided with engraved lines spaced 90 degrees. In conjunction with a single line on the locking collar, it may be set to provide a ready indication of the points where the cam drive pin just starts to engage a star slot, thus facilitating shutter timing.

Unique in the AA movement is the method used for anchoring the sprocket to the star shaft. The shaft is hollow as far back as the sprocket, and is provided with a threaded, tapered screw engaging two steel balls which it pushes outward through holes in the shaft wall to lock into matching, but smaller, holes in the sprocket body sleeve. Lateral and angular positioning of the sprocket on the shaft is provided, however, by the aligning stud, Item 8, which engages an accurately machined slot in the sprocket body. The tapered screw cannot be backed out far enough to drop the balls from their sockets because of the presence of the tubular threaded insert in the star shaft which mounts the Item 13 locking collar.

For very rapid removal of the sprocket for inspection, cleaning, reversal or replacement, it is merely necessary to back out the tapered screw, remove the locking collar, take off the outboard bearing by removing the single fastening screw which holds it on its locating dowels, release the stripper anchoring set screw, Item 16, at the bottom of the same hole, and slip out the stripper to release the sprocket. The whole operation can be performed in less than two minutes and since there is no need for removing the movement from the projector, there is no chance for disturbing the shutter timing.

The end view and Section BB indicate the construction of the tension shoe assembly. Item 25 is the shoe proper, fabricated from tough alloy steel and thoroughly hardened, ground and pol-

ished. It is tensioned by a single center spring and is thus self-aligning and self-equalizing with respect to pressure on its two runners. Referring to the detail at the upper left, the shoe is held to its support plunger by the guide bars, Item 4. This view also shows the notch in the plunger visible as the blank white area just above the Item 30 latch ball in Section BB. The plunger is tensioned by the Item 22 springs. The tension shoe assembly is opened by pushing the finger grips away from the sprocket until the latch ball is pushed into the plunger groove by the Item 31 spring. It is released, and automatically closes by pressing the release button, Item 28, which pushes the latch ball out of the groove and allows the plunger to return to its closed position.

FRAMING

The diagrammatic view (Figure 13) shows how the inner shifting frame which mounts the intermittent movement is moved vertically in V-rails for picture framing. The movement is held in place by the clamps, Item 5, and these are tensioned so that they will stay in their open positions by the springs, Item 7, visible in Section AA. The adjustable stop, Item 16, bearing against the movement rear bearing bracket permits the movement to be rotated in its seat to produce the proper mesh between its drive pinion and the wide pinion which is keyed to the vertical shaft. The wide pinion is mounted on the movable bracket, Item 12, which in turn is supported by the threaded shaft, Item 8. The flexible shaft, Item 3, from the shutter timing control via the small right angle gears, Items 10 and 11, turns the threaded shaft to move the wide pinion upward or downward and thus vary the angular relationship between the movement action and the shutter operation for fine shutter timing. The rack by which the shifting frame is moved for picture framing is Item 1. It is tensioned outward in its guides by the springs, Item 14, to take up all backlash between it and its associated pinion mounted on the through shaft carrying the large framing control knobs on either side of the projector housing. The tension springs obviously also exert braking pressure between the shifting frame and the left V-rail so as to prevent any tendency for the frame to creep in either direction, while still allowing for easy operation of the framing control. The control on the operating side is provided with an indicator dial to enable the projectionist to set the framing adjustment in the middle of its one and a quarter frame range before threading. This dial also permits him to see instantly in which direction to turn the control to correct misframes during operation without shifting the picture all the way up and down the screen.

In Figure 14 of the shifting frame assembly is shown the hardened steel V-rails, Item 2, in place. The center top sectional view shows the relationship between the rails, the inner shifting frame, and the outer supporting frame which is solidly mounted to the center frame of the projector housing. As is evident from the plan view at the lower right, the left rail is fixed in position by the tightly fitting screws, Item 4. The right rail is likewise rigidly anchored by the screws, Item 6, which loosely fit the rail holes, thus allowing this rail to be moved to the left by means of the adjusting and lock screws, Items 1 and 7, to compensate for eventual rail wear.

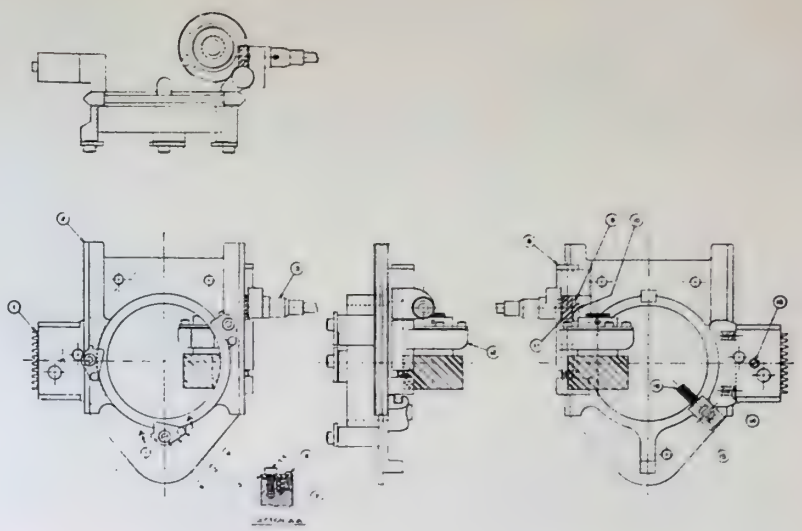


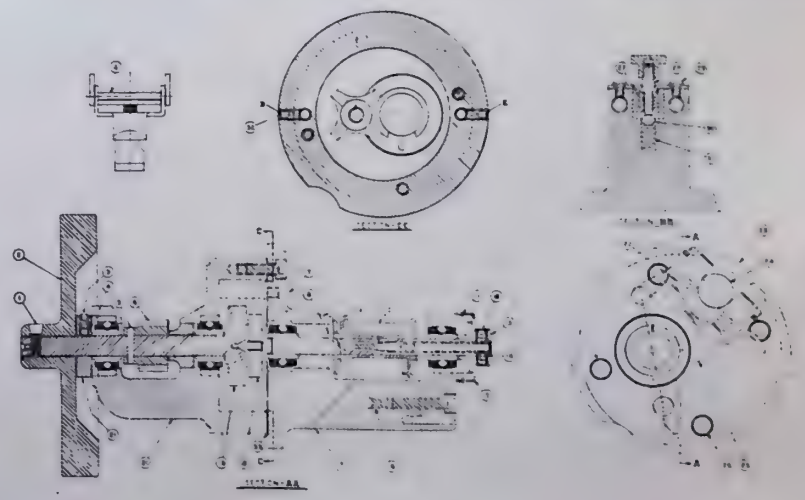
FIGURE 12—Intermittent movement sectional diagrams show the various components. Item 2 in section AA is the balance wheel, locked firmly to the cam shaft by the screw, Item 1. Item 21 is the cam shaft collar, threaded to the cam shaft and locked by Items 3 and 4. The end view and section BB indicate the construction of the tension shoe assembly, which is opened by pushing the finger grips away from the sprocket until the latch is released.

THE SHUTTER

The twin rotor double rear shutter of the Model AA features an entirely new design. It has been recognized that for best picture definition and maximum light efficiency, the shutter rotors should cut the light beam simultaneously from top and bottom as close as possible to the aperture and preferably in approximately the same vertical plane so as to preserve symmetry in the opening and closing actions. These objectives have been attained in the AA design by having the shutter consist of two concentrically mounted cylindrical rotors turning in opposite directions transversely to the light beam immediately in front of the picture aperture. The master or cutting blades of the rotors cut the light beam in planes less than one-eighth of an inch apart, and only two inches from the aperture. As the light is thus symmetrically interrupted at its narrowest possible diameter, the opening and closing actions are unusually rapid and smooth, with corresponding improvement in both picture definition and projector light efficiency.

The rotors turn in ball bearings, and have narrow balancing blades opposite the working blades and integral cooling

FIGURE 13—Inner shifting frame is moved vertically in V-rails for picture framing. The movement is held in place by clamps, Item 5, and these are tensioned so that they will stay in their open positions by the springs, Item 7, visible in Section AA. The adjustable stop, Item 16, bearing against the movement rear bearing bracket permits the movement to be rotated to produce the proper mesh between its drive pinion and the wide pinion.



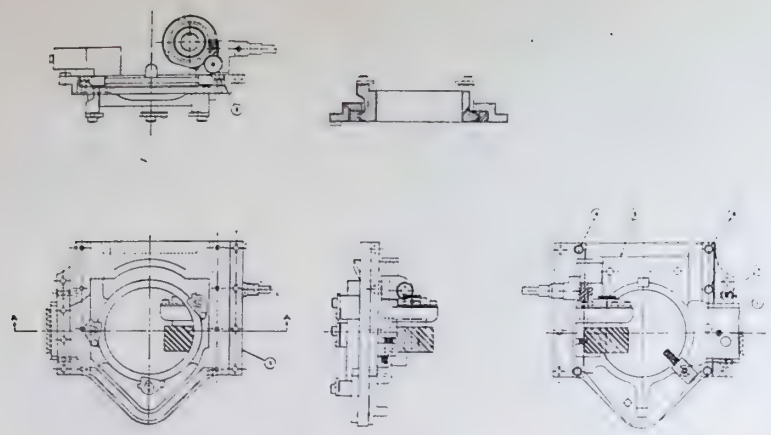


FIGURE 14—Shifting frame assembly shows the hardened steel V-rails, Item 2, in place. The top center sectional shows the relation between the rails, the inner shifting frame, and the outer supporting frame which is solidly mounted to the center frame of the projector housing. The left rail (see lower right drawing) is fixed in position by the tightly fitting screws, Item 4. The right rail is, in a like manner, rigidly anchored by the screws, Item 6.

fins to circulate cool air over their bearings and over the picture aperture. They are individually balanced dynamically so that the complete shutter operates with virtually no vibration. This is partly due to the fact that the shutter driving torque is adequately isolated from the pulsating torque at the intermittent movement drive points by the latter's relatively heavy balance wheel, and by the cushioning effect of the intervening gear meshes. Due to the basically high light efficiency of the shutter design, it has been possible to make the working blades of the rotors of such angular width as to allow for a very liberal margin of safety in the matter of travel ghost effects due to lost motion between the shutter and intermittent.

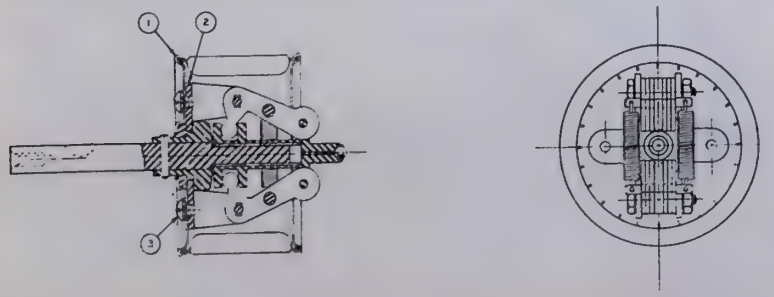
In the design of the shutter, clearance has been allowed for the cone of light from the proposed f/2.0 arc lamp optical systems using 16-inch reflectors. The shutter rotors are carefully machined from aluminum alloy castings, and are fully reinforced to prevent warping and breakage.

FIRE SHUTTERS; VENTILATION

Centrifugal actuators for fire shutters should turn at relatively high speeds for positive operation without excessive dimensions. The AA projector design combines the fire shutter actuator with a blower of really adequate capacity to properly cool the shutter and aperture. The combination blower and actuator is located in an enclosure above the shutter compartment of the projector. It draws clean room temperature air inward through vents in the projector housing under the shutter, under the track and aperture unit, and upward over the shutter and across the aperture. The heated air is exhausted through a vent grill at the top of the mechanism. The shutter and aperture are thus located within a forced draft "chute" with the light opening being closed off as far as air currents are concerned by the currents produced by the rotating shutter. Although the flow of air in the chute is considerable, the air is not forced into or drawn out of the arc lamp, and thus no harmful carbon dust and arc vapors are drawn into the projector. Neither is there any necessity for a light-losing glass filter between the shutter and light source to prevent disturbance of the arc tail-flame.

The details of the combination blower and fire shutter actuator are shown in the Figure 15. Item 1 is the cylindrical impeller. Item 2 is the support bracket for the spring tensioned, weighted arms of the centrifugal fire shutter actuator which operates the shutter proper at a film speed of 55 feet a minute through a system of levers. The supporting shaft for the unit runs in two ball bearings, one in the blower housing and one in an auxiliary bracket beyond the shaft's drive gear, which meshes into the main projector gear train. Other constructional details are self-evident.

FIGURE 15—Blower and fire shutter actuator. Item 1 is the cylindrical impeller. Item 2 is the support bracket for the spring tensioned, weighted arms of the centrifugal fire shutter actuator which operates the shutter proper at a film speed of 55 feet a minute through a system of levers. The supporting shaft for the unit runs in two small bearings, one in the blower housing and one in an auxiliary bracket beyond the shaft's drive gear.



LENS CARRIAGE

The lens carriage is designed to accommodate any make or model and virtually any focal length projection lens by using suitable cylindrical adapter sleeves. It includes several design features to facilitate accurate focusing and easy removal of the lens for inspection and cleaning.

Referring to the Figure 16, the fixed portion of the carriage is Item 4. It is rigidly attached by socket head cap screws to the tubular front extension of the main projector casting. The movable portion is the lens barrel proper, Item 5, which slides in the hardened steel V-rails of the gate assembly and is moved by the focusing control, Item 10, which is provided with a finely threaded shaft, Item 16, engaging an extension lug on its under side. Backlash in the control is permanently prevented by the spring tensioned soft slug, Item 15, bearing on the threads.

The lens is supported within the barrel by three accurately machined full-length pads. Two of these are solid projections from the barrel casting—the one nearest the lens lock control being a separate, machined casting having a lug on its rear surface which extends through a slot in the barrel casting to engage the threaded shaft, Item 9, of the lock control, Item 18. This pad, or clamp, has a slight taper on the surfaces which contact the guide slot in the barrel, and therefore, as it is drawn forward by the lock control, moves inward to clamp the lens rigidly in place. It cannot throw the lens out of alignment with the barrel, since it is the third member of a three point support system where the alignment is determined by the other two fixed members.

Items 11, 12 and 13 constitute an adjustable stop for longitudinal positioning of the lens within the barrel, and Items 1, 2 and 3 make up an extractor unit for shorter lenses. Projection lenses are thus easily removable for cleaning, and may be removed and replaced without disturbance to the focus setting.

SPROCKET PAD ROLLERS

The same general design is followed in both pad roller bracket assemblies of the AA projector. In the Figure 17, showing the double pad roller assembly for the lower feed sprocket, the bracket swings on the shaft, Item 1, which is locked into a boss on the projector center frame. The shaft is provided with a grease recess, and carries on its outer end a knurled finger rest, Item 4. It is also provided with a notched cam section fitting into a recess in the bracket hub. One long straight notch, in conjunction with the stud pointed stop screw, Item 3, and locking screw, Item 5, limits the total travel of the bracket. Two V notches in conjunction with the steel ball, Item 6, and spring, Item 7, tension the bracket in its open and closed positions. The adjustable stop, Item 10, bearing against the center frame boss for the sprocket shaft, regulates the clearance between the outer roller and the sprocket.

The inner roller's shaft has an eccentric mounting stud, thus permitting the clearance between this roller and the sprocket to be independently adjusted. Both roller shafts are hollow and have small holes under the rollers to communicate with grease reservoirs in the rollers. Semi-annual greasing through the shafts is sufficient to insure adequate lubrication of the rollers.

LIGHTING AND WIRING

The Model AA projector is provided with two auxiliary interior lights. The irregularly shaped structure in the upper right corner of the film compartment houses a lamp for general illumination of the projector interior, with an on-off toggle switch at the lower edge of the housing. The flat contour of the housing mounts a glass shield to protect the lamp, and as an extra safeguard in the event of accidental lamp breakage.

The second light is within the shutter enclosure below the secondary framing aperture. This aperture is slightly above and to the rear of the upper guide rollers. The lamp socket is carried by a plug-type support inserted from the drive side of the center frame. The framing aperture has a glass shield to prevent the entrance of dirt, and is equipped with two registry pins. The linear relationship between these pins, the secondary aperture, and the actual picture aperture is such that when the film is on the pins and is properly framed in the secondary aperture, it is likewise correctly framed at the picture aperture. There is thus no need to engage in awkward contortions to see the picture aperture during film threading, and framing can be checked at any time prior to starting the machine merely by bending the upper film loop back over the framing aperature. This simple but eminently practical device eases the projectionist's work, and what is perhaps more important, enables him to present a smoother and better performance.

Both lights are controlled by the toggle switch previously mentioned. They are normally equipped with 115 volt lamps, but the sockets also accommodate certain low voltage lamps for service in localities where local regulations prohibit the use of standard voltage lamps within the projector. The asbestos and glass braid insulated interior wiring of the projector terminates in a multi-contact socket and plug unit located in the wall of the drive gear compartment. Sufficient cabled lead wires are supplied attached to the plug to reach inside the projector pedestal or to wall junction boxes, thus insuring that exterior as well as interior projector wiring will be both orderly and safe. The plug and socket connections permit the projector mechanism to be quickly and easily demounted for sound reproducer servicing or for periodic projection room equipment overhaul.

The electrical changeover device is of generally standard construction, although the special model for the AA projector includes thermostatic protection for the operating coils and is arranged to make use of the projector's internal changeover wiring, as well as its built-in changeover shutter, which operates in an extra set of guides before the automatic fire shutter in the light path.

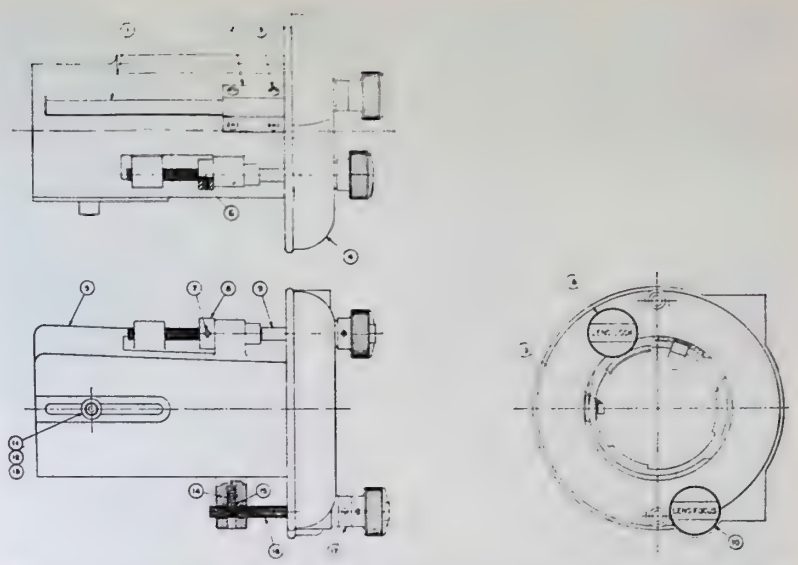


FIGURE 16—Lens carriage. The fixed portion of the carriage is Item 4. It is rigidly attached by screws to the tubular front extension of the main projector casting. The movable portion of the lens barrel proper, Item 5, which slides in the steel V-rails of the gate assembly and is moved by the focusing control, Item 10, which is provided with a finely threaded shaft, Item 16, engaging an extension lug on its under side. Backlash is prevented.

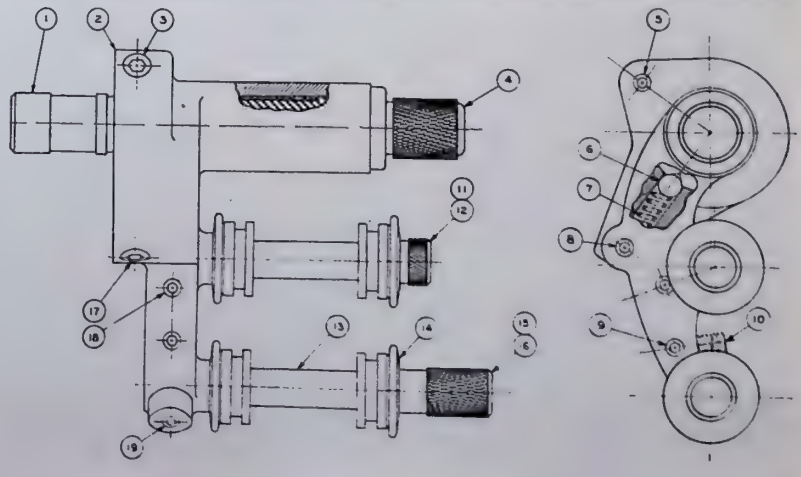
SUMMARY

The Motiograph Model AA, while presenting a vast number of entirely new features, is nevertheless designed so that it affords complete interchangeability with older types of equipment. The base layout, the drive point location, speed and direction of rotation, and the magazine mounting facilities of the AA projector are similar to those of other currently available machines. It may therefore be used with any modern sound reproducer and with any make of upper magazine without changing the existent projector drive and without using mechanism mounting plates or special adapters of any kind.

Although production is just getting under way, the Model AA has already been hailed as the most outstanding piece of equipment in motion picture projection history. The machine produces the type of picture on the theatre screen that the industry has the right to expect in this highly advanced postwar engineering era.

Expertly engineered and constructed to precision requirements by skilled craftsmen, the AA marks a fitting culmination to the first half century of the projection of motion pictures.

FIGURE 17—Double pad roller. The same general design is followed in both pad roller bracket assemblies. The bracket swings on the shaft, Item 1, which is locked into a boss on the projector center frame. The shaft is provided with a grease recess, and carries on its outer end a knurled finger rest, Item 4. It is also provided with a notched cam section fitting into a recess in the bracket hub. The long notch limits the bracket's total travel.



Perfect Projection Should Be the Standard

Correction of Common Projection Faults Considered as a Function of Management

LESTER M. ISAAC and M. D. O'BRIEN
Projection Department, Loew's, Inc.

Loew's sells merchandise.

But Loew's sells only one article of merchandise—a moving picture on a silver screen.

The picture must be perfectly presented. It makes no difference if that picture is "The Green Years" or a horse opera, if your orchestra section has velvet plush seats or not, if your theatre has the latest air-conditioning system, if your usherettes look like Ava Gardner, if the publicity, advertising and exploitation men have been properly beating the drums, or even if you have chocolate bars in your candy machines—if your film is not perfectly presented people will not patronize your theatre.

The motion picture itself is Loew's merchandise—and unless this merchandise is perfectly presented, Loew's loses.

It is, therefore, of vital importance that in this Lo! series of theatre operations articles, the subject of motion picture projection in direct relation to theatre management be thoroughly discussed.

The accompanying consideration of good projection is reprinted by permission from the June 1, 1946, issue of Lo!, house organ of Loew's, Inc.

COMMON FAULTS

It is the responsibility of the manager and his assistants to be in a position to recognize defects in the projection of movies in their theatre, and to be able to point out clearly the effect (though not necessarily the cause, which is the projectionist's function to determine), of such a defect to the projectionist and, if necessary, to the Projection Department.

Fuzziness

For example, consider Figure 1, a scene from MGM's Van Johnson-Esther Williams picture, "Easy to Wed". On the right hand side the scene appears clear, well-defined and evenly illuminated. But on the left the same picture shows a distinct fuzzy appearance in the center, together with uneven illumination.

This—the lack of clarity in the center of the picture and the uneven illumination over the entire picture—should be described carefully by the manager or his assistant to the projectionist, who from this clear description of the effect can determine the cause of the defect.

In this particular case, the fuzzy appearance of Esther Williams and the others in the background may have been caused by one of several defects in the projection booth. The lens in the projector may not have been in microscopic focus, a condition easily rectified by the projectionist. This would have been the likely cause of trouble had the fuzziness continued over a period of time.

If this fuzziness continues intermittently, appearing to go constantly out of

"THE SHOW MUST GO ON—AND STAY ON" is the motto of the projection department of Loew's, Inc., and these men have been largely responsible for the fact that this slogan has been followed. Left to right they are M. D. ("Obie") O'Brien, assistant supervisor; Lester M. Isaac, supervisor; and F. William Boettcher, engineer.

It is the responsibility of the manager and his assistants to be in a position to recognize defects in the projection of motion pictures in their theatres and to be able to point out clearly the effect (though not necessarily the cause, which is the projectionist's function to determine) of such defect to the operator on duty.

focus and soon return to normal, throughout the run of the film, it is probable that the print is buckled or that the tension shoes at the aperture of the projector need additional tension. If the projectionist is notified of this condition and makes an unsuccessful effort to correct it by adding tension, it should be easy for the projectionist to recognize the other cause of the difficulty and notify the manager that the film is buckled. The manager can then obtain another print from the exchange.

Conditions occasioning uneven illumination across the entire screen are an indication of some momentary, inherent defects in the carbons or that a slight misalignment of the lamphouse optical system has occurred. These conditions also are readily rectified by the projectionist.

Misframing

Figure 2 shows a "misframe"—which may appear as shown or may appear with the bottom cut and the blank space at the top. This effect is not always caused by the carelessness of the projectionist, but may be the result of a misplaced splice made by another theatre which had escaped detection by film exchange examiners. Calling the projectionist's attention to this condition should immediately eliminate it, as the projector is properly equipped with the necessary machinery to reframe the picture on the theatre's screen.

Sound Track Screened

In Figure 3, we have a picture condition caused by the aperture on the projector not being positively seated. There are times between reels when the projectionist find it necessary to slip out this aperture for cleaning and sometimes he does not push it back to its extreme limits. This is the common cause of exposure of the sound track on the screen.

At rare intervals, however, it may be the result of a faulty print, especially if the picture is foreign-made, for sometimes the positive print is inaccurately positioned in the printer when copies are produced from the negative. Also, if the aperture on the camera employed to photograph the picture was over the size of the standard American-made cameras, the same appearance of the sound track on the screen will result.

Out of Focus

A picture completely out of focus over the entire surface of the screen is positive indication that the lens is out of focus. This is easily remedied by the projectionist.

Though in focus, a dirty or oily lens will cause the picture to take on a fuzzy, spotty appearance and will introduce a halo or double image on all objects in the picture.

If the picture appears brown on any one of the four sides of the screen, another common occurrence, this would indicate that the optical alignment of the carbons is off-center. The projector arc lamps are equipped with suitable lateral and horizontal aligning handles to correct this condition.

In case of flickering, or light intensity varying with great rapidity, the projectionist should ascertain whether the carbon arc is of improper length, or whether the exhaust blower is pulling too strongly on the lamp. In the former, it may be that the arc-feed motor is not properly feeding the carbons and requires some attention.

In the latter case—the exhaust blower pulling too strongly on the lamps—an adjustment of the smoke stack damper in the lamphouse will reduce the blower suction.

FIGURE 1—Fuzziness. On the right-hand side, this scene appears clear, well defined, and evenly illuminated. But on the left, the same picture shows a distinct fuzzy appearance on the center, together with uneven illumination. This lack of clarity at the center of the picture and uneven illumination all over the picture should be described carefully by the manager or his assistant to the projectionist who can then determine the cause of the defect.

Travel Ghost

If white objects in the picture appear to have elongated tails of light extending from the bottom downward or from the top in an upward direction, with a slight tendency to flicker, the condition known as "travel ghost" is indicated. (Figure 4.)

"Travel ghost" is caused by improper timing of the revolving shutter and can be corrected by the projectionist. This "travel ghost" is most noticeable on titles, and if any suspicion exists that it is present a more careful check and ef-

FIGURE 2—Misframe. A misframe, which may appear as shown or may appear with the bottom cut and the blank space at the top. This effect is not always caused by the carelessness but may be the result of a misplaced splice made by another theatre which had escaped detection by the film exchange examiners. Calling the projectionist's attention to this condition should immediately eliminate it, as the projector is equipped with a reframer.

FIGURE 3—Sound track screened. Here is a condition caused by the aperture on the projector not being positively seated. There are times between reels when the projectionist finds it necessary to slip out this aperture for cleaning, and sometimes he does not push it back to its extreme limits. This is the common cause of the exposure of the sound track on the screen. At rare intervals, it may be the result sometimes of using a faulty print.

fort at correction should be made when main titles or newsreel titles are being projected. The projectionist is able to operate a handle, left or right, which corrects timing of the revolving shutter.

Keystone Effect

In the greatest percentage of theatres, the projection equipment is necessarily located in the upper portion of the auditorium, which is unfortunate as it creates an optical defect on the screen known as the "keystone" effect. A careful inspection of the projected light on the screen, either with or without film, will reveal the fact that the light appears to spread more at the bottom of the picture than it does at the top, although to the audience the picture looks perfectly rectangular.

FIGURE 4—Travel ghost. If white objects appear to have elongated tails of light extending from the bottom downward or from the top in an upward direction, with a slight tendency to flicker, the condition is known as travel ghost. It is caused by improper timing of the shutter and can be corrected by the projectionist. Travel ghost is most noticeable on tiles, and if any suspicion exists that it is present, checks should be made at once.

A "keystone" is occasioned by the fact that tilting the projector in a downward position tends to bring the top portion of the lens closer to the screen than the bottom of the lens, thus causing the top portion of the picture to be narrower than the bottom. (Figure 5).

This follows the fundamental law of optics that the farther away a lense the wider the territory it will cover. Therefore, nothing can actually be done to correct it.

However, the masking on your screen has been installed almost vertically, permitting this extended width at the bottom of the picture to overlap the mask. This mask of black velour serves to partially absorb this spilled light and makes it almost invisible to the audience by comparison with the higher percentage of light reflected from the screen's surface.

Extraneous Light

The motion picture screen's enemy is extraneous light. The projection room is equipped with a powerful electric plant in order to generate sufficient illumination to comfortably illuminate the projected picture, but the physical nature of the equipment is such that it is only possible to present from 10 to 20 per cent of this generated light to the surface of the screen. Therefore, any theatre lighting which serves to reduce this reflected light may cause your patrons discomfort.

Continuous efforts should be made to insure against the possibility of stray light from wall brackets, ceiling fixtures, exit lights, and other sources, reaching the screen.

Most present-day lamps for theatre lighting other than blue are predominantly of the red type including amber, orange, pink or red lamps. It is recommended where this red type is employed that minimum wattages be used, so that the darkened theatre will provide the proper setting for perfect projection and at the same time will not present any hazards for patrons leaving and entering the auditorium.

The degree of light can be best noted by turning on all normal theatre lighting after the theatre is closed, and observing the effect of this light on a blank screen with projector shut down. If the screen presents a decidedly reddish appearance there is, in all probability, too much of the wrong kind of light reaching the screen.

Green lamps are permissible for the summer season, but old, faded lamps should not be employed in the audtiorium as such lamps will cast a greenish white light which robs the screen of its brilliancy.

Jumping and Side Weave

One more common defect in projection is a jumping film. This trouble is often occasioned by the fact that the film's perforations have been badly damaged, or that the film is "green" causing emulsion to deposit on shoes and harden.

Other causes of jumping include improper tension at the gate, worn tension springs, improper closing of the gate and faulty threading.

Side weave, another trouble sometimes encountered, wherein a picture appears to move in a lateral direction intermittently

across the face of the screen, is a result of incorrect adjustment or worn tension springs on the lateral guide rollers.

Calling the projectionist's attention to the condition of side weave, will serve to inform the manager or his assistant as to which one of the two possible causes is creating this effect. In the event of worn springs, it will be necessary to replace them as soon as possible.

In such a case, as with all the other projection defects, the manager should hasten to phone the booth and explain to the projectionist as clearly as possible the condition on the screen.

EXPENSIVE PROJECTION

The most essential factor in perfect projection, however, is proper maintenance of the projection equipment. It is, therefore, advisable that the manager and his assistants to familiarize themselves with the period of frequency with which certain parts of the equipment should be replaced.

This observation would include noting the normal amount of carbons used over a week's period. Any unusual deviation in quantity should be investigated and, if there remains a question, should be reported to the Projection Department.

The above condition is normally checked by the Projection Department through carbon reports forwarded to the home office. However, there have been times when reports have not reached the Projection Department.

Projector parts that require periodical replacement include condensers, which gradually become pitted from copper and carbon deposits on the surface and must be either replaced or resurfaced.

The carbon-holding jaws, both positive and negative, subjected to the very high temperature of the lamphouse all day, deteriorate eventually despite constant cleaning to the point where they no longer grip the carbons.

Other parts to be replaced in time include the tension shoes, sprockets, take-up chains, tension springs, lamphouse gears, motor brushes, motor generator brushes and springs, starter contact fingers, and minor items from the projector, lamps, and motor generator.

The motor generator is watched for arcing and ridging of the commutator. Such a condition should be reported by the projectionist to the manager, who should call the Projection Department at once.

A WORD OF WARNING

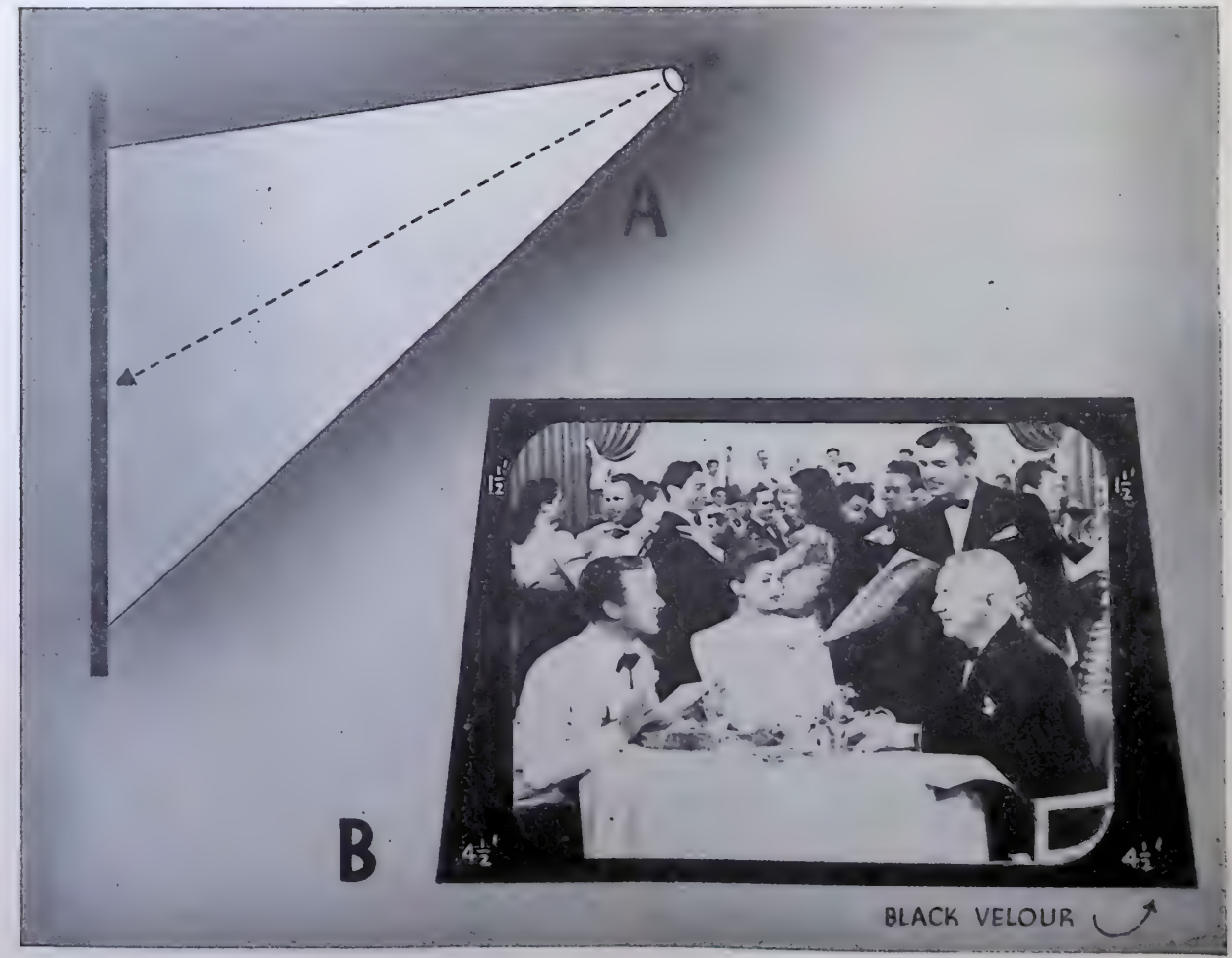
A word of caution is added here—under no conditions is emery cloth or paper to be used on the generator, commutator, or brushes, as this material contains mineral deposits which affect the performance of the generator.

Miscellaneous consumable accessories include oil, film cement, cleaning fluids, and other items easily checked for abnormal consumption.

If it is the considered opinion of the manager the quantity of supplies or replacement parts is in excess of what he feels is normal, he should communicate with the Projection Department for assistance in clarifying the matter.

The manager should make periodical visits to the projection booth to check both on the cleanliness and good housekeeping of the room and on the amount of spare parts and equipment on hand.

FIGURE 5—"Keystone" effect is occasioned by the fact that tilting the projector in a downward position brings the top portion of the lens closer to the screen than the bottom of the lens, thus causing the top portion of the picture to be narrower than the bottom. This follows the fundamental law of optics that the farther away the lens the wider the territory it will cover. Therefore, nothing can actually be done to correct it. However, the masking on the screen has been installed almost vertically, permitting the extended width at the bottom of the picture to overlap the mask. The masking absorbs some of the light spilled at the side of the picture.



Copper-Oxide Rectifiers for Theatre Use

Development, Characteristics, and Uses Of a Popular Current-Changer Set Forth

R. B. FREEMAN
Westinghouse Electric Corporation

The introduction some years ago of the now well-known high intensity carbons for motion-picture projection arcs called for a change in the characteristics of the arc power supply. Low intensity lamps, which previously had been standard, operated at about 55 volts direct current and 25 to 35 amperes. The usual source of power was an 80-volt motor-generator set with a ballast resistance in the load circuit. The high-intensity lamp voltage was considerably lower, 32 to 34 volts, while the current was 50 to 65 amperes, depending on the size of the carbon.

The new power requirements turned out to be well suited to rectifiers of the copper-oxide type. Units of 50 and 65 amperes were developed using the standard 1½-inch diameter discs cooled by a small propeller-type fan. These were installed in large numbers and gave a good account of themselves. Their features of low maintenance, good efficiency, low installation cost, and quiet operation were very attractive.

In 1939, a step forward in the rectifier art was taken with the development of the large copper-oxide plate. One plate, measuring 12 inches by 4⅝ inches, with both sides oxidized, was equivalent in area to 50 of the 1½ inch discs. This obviously gave a great advantage in those aplications where fairly large currents were required which could hitherto be handled only by paralleling many of the small discs.

As a result, the disc-type projection-arc rectifier was superseded by the plate-type unit. The gain in reliability and simplicity which resulted is evident from the fact that the number of rectifying elements was reduced from 1080 in the disc-type unit to 36 in the plate-type. Other gains were also made, such as reductions in size, cost, and weight. In addition, an actual reduction in current density in the rectifier was obtained, which was also a step in the direction of greater reliability and longer life. Obvious improvements in the matter of cooling and uniformity of cooling air distribution resulted. (Figure 1.)

CONSTRUCTION

The construction of the plate-type projection-arc rectifier is simplicity itself. Only three major items are required: the power transformer, the rectifier unit, and the ventilating fan. A small a. c. contactor of the de-ion type is also used to provide the necessary remote control. (Figure 2.)

The transformer is a three phase, insulating type, of fairly high reactance. A transformer is needed to step the voltage down from the 220-volt, three phase normal power supply to the approximate voltage of the arc.

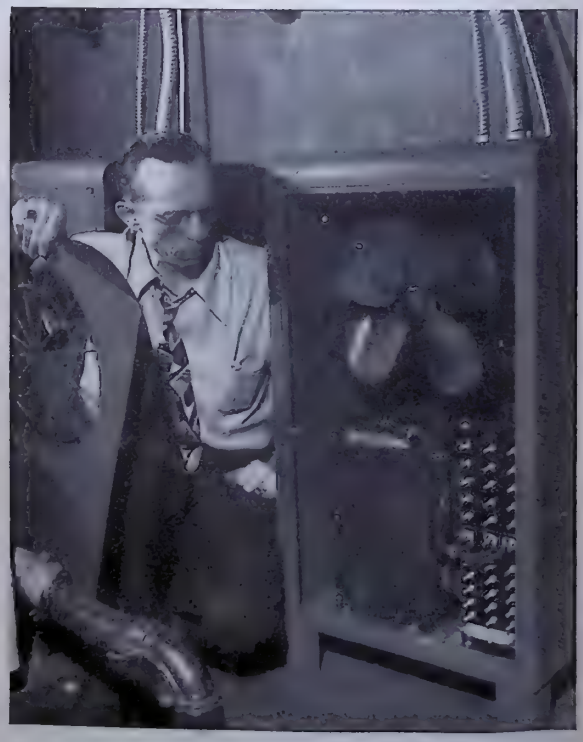
The rectifier is built as a single unit, and consists of three rows of twelve plates each on a common mounting plate, completely enclosed in a metal housing which serves as an air duct and also affords mechanical protection.

A four-bladed, 14-inch diameter, motor-driven, propeller-type fan is used. The fan draws a large volume of room air over the rectifying plates and assures dissipation of the losses in the rectifier with a very low temperature rise on the plates.

The de-ion contactor is located in the primary circuit and is operated by the switch at the lamp to start or stop the rectifier.

FIGURE 1—These two copper-oxide rectifiers are installed in a West Virginia theatre. Each unit is completely enclosed so that no contact is possible with the energized parts. The horizontally-mounted fan draws the air from the base, and throws it out on the front side, insuring proper ventilation under all conditions.

FIGURE 2—One of the units is seen with the front cover removed showing the plate assembly, and transformer tap terminal panel. This unit supplies 65 amperes for a 7-mm. negative, 8-mm. positive carbon arc from a 230-volt, 60-cycle, 3-phase service supply. This type of rectifier has satisfied many of the nation's theatres.



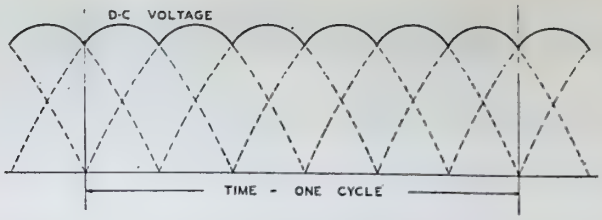


FIGURE 3—Graph showing the d.c. voltage wave form for a balanced copper-oxide rectifier when the service supply is 3-phase, 60-cycle, alternating current. In rectifier assembly, care is exercised to see that the voltage drop in each leg of the unit at the rated current is the same as in all legs. (Compare with Figure 4.)

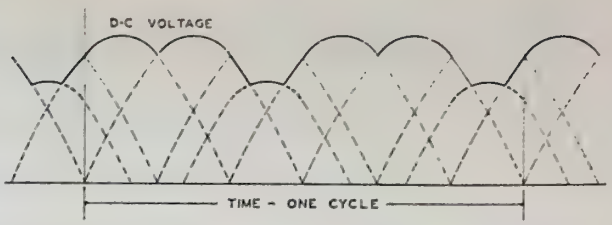


FIGURE 4—Graph showing the d.c. voltage wave form for an unbalanced copper-oxide rectifier when the service is 3-phase, 60-cycle, alternating current. This case of unbalance would produce an objectionable beat frequency with the shutter. (Compare with Figure 3.) (Westinghouse Electric Corporation photos and graphs.)

CURRENT CHARACTERISTICS

In the process of assembly of the rectifier unit, care is exercised to see that the voltage drop in each leg of the unit at rated current is the same as in all other legs. The purpose of this is to be sure that the output voltage wave is well balanced. Such a rectifier having all legs properly matched, delivers a voltage wave such as shown in Figure 3. It will be seen that both halves of each a. c. phase are rectified, with six small voltage loops showing in each cycle. The ripple voltage in the output wave is small, being less than five per cent of the average value of the output. A very important point is that the fundamental frequency of the ripple voltage is 6 times the supply frequency, or 360 cycles. As the shutter runs at 48 rps and has 2 blades, the shutter frequency is 96. Hence, the beat frequency produced on the screen is 360 minus 96 or 264 cycles, which is not visible. The screen without any picture then will have a steady pure white light.

The importance of proper matching of the rectifier resistance is illustrated by Figure 4, showing an extreme case of unbalance. It is evident that the envelope of this wave contains a 120 cycle component which would produce a beat frequency with the shutter of 24 cycles. This would be visible and objectionable.

It is also evident that single phase power supply is unsatisfactory for the same reason. A single phase rectified voltage has a frequency of 120 cycles, which again produces the objectionable 24 cycle beat frequency on the screen.

STABILITY REQUIREMENT

Stability of arc operation requires some type of ballast in the power supply. In the event a motor generator is used, the ballast takes the form of a resistance bank which of course detracts from the efficiency. In the rectifier design, the ballast effect is obtained by means of reactance in the transformer which involves no loss of power. Over-all rectifier efficiency then is approximately 70 per cent, power factor 85 per cent, while the motor-generator set efficiency with ballast included is likely to be only 50 per cent. This difference results in a real saving in power costs.

A second reason for having ballast in the power supply is that arc current must be limited when the arc is struck. In order to strike the arc, the carbons must be frozen, which practically short circuits the power supply. If the current during this condition is not limited, the carbons will be damaged. Some type of ballast is required to create the necessary voltage drop and to keep the arc striking current within bounds. Here again the transformer reactance plays its part, producing the necessary voltage drop without a corresponding loss in power.

RECTIFIERS IN USE

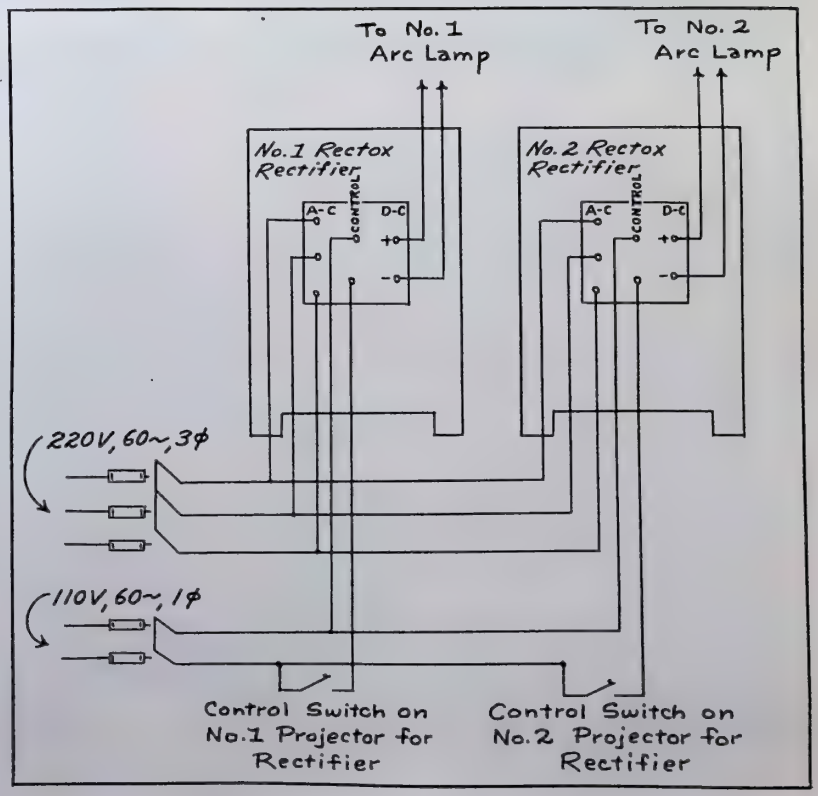
In Figure 1, a pair of the latest design of copper-oxide projection arc rectifiers is shown in operation. Each unit is completely enclosed so that no contact is possible with energized parts. Ventilating air is drawn in through the base and exhausted at the front.

In Figure 2, one of the units is shown with the front cover removed. At the left is shown the enclosed rectifier unit. At the right is a terminal board containing transformer taps which give ample adjustment of voltage to take care of varying line voltage conditions and of the slight amount of forward aging which may occur in the rectifier. The proper taps are selected when the rectifier is installed, and will probably never have to be changed thereafter.

The power transformer is mounted in back of the terminal board.

The plate-type copper-oxide rectifier for motion-picture arc supply has been designed specifically for the work it has to do. It has the characteristics needed for proper striking of the arc, and also automatically establishes the correct working conditions for subsequent arc operation. The wiring diagram is shown in Figure 5. It is a unit with no moving parts, other than the ventilating fan motor, which requires very little attention. Installation is simple, as the rectifier requires no special foundation, therefore, can be set down on any reasonably level floor. As a stable, reliable, trouble-free source of power, it leaves little to be desired.

FIGURE 5—The wiring of two copper-oxide rectifiers, serving two projection arc lamps. The electrical connections are easy to make, just as the mechanical installation of the rectifier is simple. These plate-type, copper-oxide rectifiers for motion-picture arc supply have been designed specifically for this work, with all the characteristics needed for striking the arc and automatically establishing the proper conditions for the operation of the arc.



The Magnesium-Copper Sulphide Rectifier

Notes on the Construction and Operation Of Six-Phase, Full-Wave Current Changers

S. L. CHRISTIE
President, McColpin-Christie Corporation, Ltd.

The greatly extended use of metallic disc-type rectifiers during the war has resulted in important developments in this field. Particular reference is made to the outstanding progress made with magnesium-copper sulphide (M-CS) rectifiers within the heavy current field. In its present state of perfection the M-CS rectifier stack is a component of great dependability. One of the reasons for its increasing use is its ability to operate in high ambient temperatures and to withstand heavy intermittent overloads.

Although ordinarily operated at a temperature well below 200 degrees Fahrenheit the M-CS stacks can safely stand an operating temperature of 265 degrees Fahrenheit. This compares with a maximum temperature of 180 degrees Fahrenheit for the nearest of other types of metallic disc rectifiers.

Because the M-CS stacks do not need to be operated close to their maximum safe temperature limit, these stacks apply themselves well to thermostatic protection by a slowly operating thermostat which does not cause nuisance interruptions from temporary overloads.

In comparing the efficiency of rectifiers for arc lamps with that of rotating converters or motor-generators, it must be borne in mind that the latter usually are made to operate with a series resistor or ballast in the d.c. circuit, whereas metallic rectifiers operate without ballast. As such ballast consumes an additional amount of power equal to 30 percent or more of the power required for the arc alone the lower power consumption of the generator is offset by the additional losses in the ballast used.

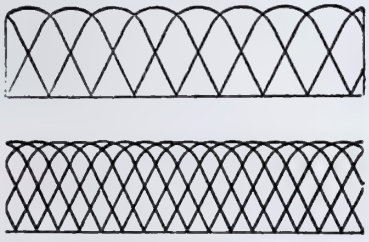
The pulsation or ripple has a noticeable effect on the light from the arc when projected on the screen through the intervals of the shutter, usually moving at 96 frames a second.

To analyze this, let us consider first a rectifier of the half-wave type, fed from an ordinary single-phase light circuit. Such a rectifier or electric valve only lets through one-half of each cycle of the a.c. voltage and blocks out the other half. The result is one impulse to the cycle, or 60 impulses a second with 60-cycle a.c. supply. This pulsation or ripple would show up as objectionable flicker on the screen.

For this reason, single-phase rectifiers for arc lamps are of the full-wave-type, that is, using both halves of the a.c. cycle.

As there is one impulse for each half-cycle, this type gives 120 impulses a second on a 60-cycle supply. Rectifiers which employ bulbs usually have a stabilizing choke in the d.c. circuit which tends to smoothen out the ripple.

However, with single-phase supply, a pronounced ripple is practically unavoidable, and for this reason single-phase



WAVE PATTERNS of the typical three-phase rectifier (top) and the six-phase rectifier (below), such as the one described in this article. Such a rectifier operates on the usual standard three-phase power lines.

rectifiers are ordinarily only used where 3-phase supply is not available.

The next better step is the use of a 3-phase, half-wave rectifier, fed from a 3-phase power line. Such a rectifier gives 180 impulses a second.

We now come to the commonly-used type of rectifier for larger motion picture projectors, the 3-phase, full-wave (bridge-type) rectifier. This gives 360 impulses a second when operated on a 60-cycle current.

Although this type has been generally accepted in the industry and furnished

THE C AND C, 6-PHASE RECTIFIER has a 70-ampere capacity, with magnesium-copper sulphide stacks. This Type H2870, with a 35-volt rating, is said to be the smoothest source of rectified power for arc lamps.

by the leading manufacturers up to the present, even the 3-phase, full-wave rectifier does not deliver a perfectly flicker-free light.

To overcome this, a new 6-phase, full-wave rectifier has recently been developed for motion picture projection. This is equivalent to 12-phase, half-wave rectification, such as is used in large central power stations supplying direct current to electric railroads and streetcars.

With a 3-phase, 60-cycle a.c. supply, this rectifier delivers 720 impulses a second; and, with the close overlapping of the phases thus obtained, the ripple has practically disappeared and the improvement in the light is very gratifying. It can well be said that this represents a major step in the development of rectifiers and in the striving for perfection in projection.

A second objection to rectifiers has been brought forth in the past. Unlike the more common electrical loads on a power system, all single-phase and 3-phase rectifiers produce in the power line certain harmonics which, in unfavorable cases, may be picked up by sound systems.

With the 6-phase, full-wave rectifier of proper design, the current drawn from power line is so nearly a pure sine wave that harmonics of a disturbing magnitude are not produced. Interference from sparking commutator brushes, as can occur in generators, is, of course, non-existent in rectifiers.

A few words to explain how 6-phase rectification is possible from a 3-phase supply line may be of interest to some of the readers. Without going into too many technicalities the system consists of splitting each leg or phase of the rectifier transformer into two separate parts, then cross-connecting a part of one leg to a part of another leg in such a way that each part gives an impulse which follows by 30 electrical degrees (1/12 of a cycle of 360 degrees) after the preceding impulse. This is analogous to a 12 cylinder double acting combustion motor, as compared to a 6 cylinder motor, using only a very light flywheel. Like the 12 cylinder motor the rectifier delivers a perfectly smooth flow of power.

Thus, another development, forced by the stress of war, has been applied to useful applications in peace and motion picture rectifiers have taken a major stride forward.

With the above objections completely overcome, new additional features added such as increased compactness, improved remote control system, simplified switching arrangement, larger capacity for longer throws, yet retaining the original economy inherent in rectifiers, the 6-phase rectifier is destined to become the dominant source of direct current for motion picture projection.

Selenium Rectifiers in Current Conversion

War-Improved Equipment Discussed as Means of Converting Theatres' Electric Current

JULIAN LOEBENSTEIN
Electrical Engineer in the Seletron Division, Radio Receptor Company, Inc.

Under war stimulus many improvements have been made in the selenium rectifier and its range of application has been widened. For many years its long life and dependability have been known and these characteristics have been further proved by additional experience.

Whereas a few years ago the dimension of the selenium plates was limited to relatively small sizes, with a correspondingly large bulk for high current capacities, the plate sizes now have been increased to aproximately thirty square inches. Also, in past years, the maximum voltage applicable to individual plates was 18 volts a.c. Now plates capable of sustaining much higher voltage have been developed, making it unique among dry plate rectifiers.

RECTIFIER USES

This means that for a given applied alternating current voltage fewer plates need be used than was formerly the case making it both convenient and economical to handle applications such as theatre arc projection, electro-plating, and other electro-chemical uses, as well as battery charging, welding, business machines, cathodic protection, motor speed control, and the replacement of vacuum tubes in home radio sets.

The list is brief and just touches a few of the many applications. Previously, in many of these uses, rectification

THE 12-VOLT, 3,000-AMPERE RECTIFIER UNIT, containing Seletron selenium rectifiers and manufactured by the Richardson Allen Company, is typical of the commercial product. Besides the high efficiency, long life, and low weight of selenium rectifiers using aluminum plates, they have the advantage of being ready for instant use at any time, as they do not need a warming-up period. Also their efficiency is uniformly high over a wide load range and they involve no standby losses when not under load. In addition, they have the favorable feature of almost 100 per cent power factor. Selenium rectifiers are proving advantageous in many places.

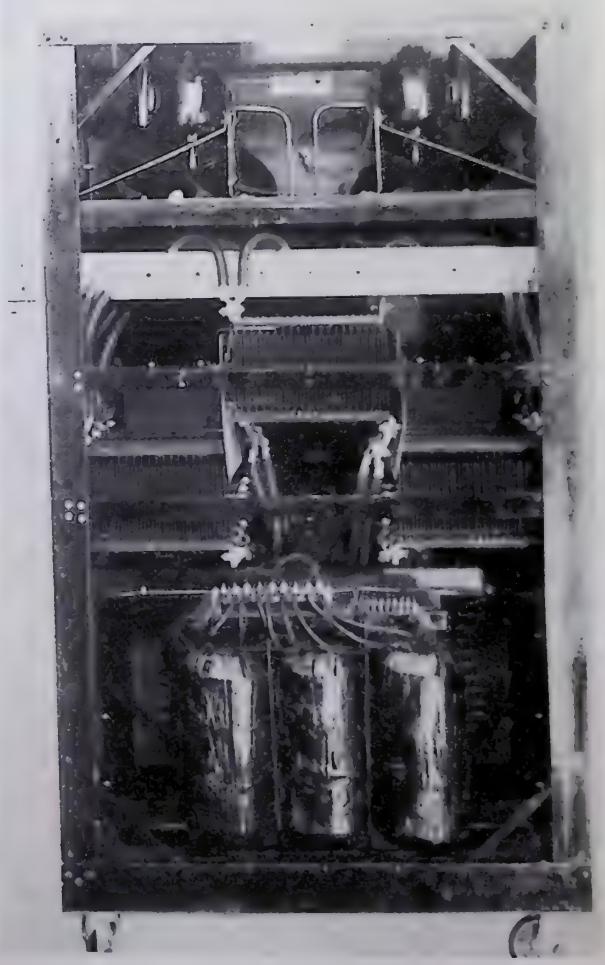


TABLE 1—The percentage of normal rating of maximum R.M.S. reverse voltage and maximum D.C. amperes under varying ambient temperature conditions.

Ambient Temperatures	Maximum R.M.S. Reverse Voltage	Maximum D.C. Amperes
	Percentage of Normal (35°C) Rating	Percentage of Normal (35°C) Rating
40°C (104°F)	100	84
45°C (113°F)	100	63
50°C (122°F)	100	47
55°C (131°F)	80	63
	80	47
60°C (140°F)	60	63
	80	30
65°C (149°F)	60	47
	60	30
70°C (158°F)	60	10

was limited to other methods. However, the experience of many manufacturers who have used selenium rectifiers has made them turn to them more and more as these improvements have developed new fields of application. Even the general consuming public has become aware of the advantages of this type of rectifier and is requesting battery chargers incorporating selenium stacks.

MANUFACTURE

Although the rectifier plate as an end product incorporated in a rectifier stack seems like the simplest possible device, its manufacture involves a number of stages, all of which require the greatest skill and careful chemical control. A rectifier base plate is prepared so that a layer of selenium may be applied and then a layer of alloy may be placed over the selenium. The base plate serves as one electrode and the metal alloy as the other. In addition, the plate is treated in such a manner that it presents a high resistance to the flow of current from its alloy front electrode to the aluminum back electrode and a low resistance to the current flow from the aluminum to the alloy electrode. The high resistance from front to back electrode is called the reverse resistance (or leakage), while the low resistance from the back to front electrode is known as the forward resistance. Theoretically, the greatest degree of rectification would be obtained if the rectifier had an infinite reverse resistance and zero forward resistance. Naturally, this condition is impossible to achieve in production, but the more nearly it can be approached, the more efficient the rectifier. These characteristics are shown in Figure 1, in connection with which it should be noted that the reverse current and voltage are plotted to a different scale from the forward resistance.

Some selenium rectifiers use a base plate of aluminum and this results in an exceedingly light stack which is easy to handle in assembly and reduces the weight of the product in which it is used. The use of aluminum also eliminates the possibility of the base plate rusting.

DESIGN AND SELECTION

The selection of the proper stack depends upon a number of factors and it is, therefore, desirable to give the manufacturer full information regarding the proposed use and conditions of application. For instance, for a given d.c. output, different stack designs are required if the d.c. circuit feeds into a resistive load, a capacitive load or load with a counter-electromotive force such as is encountered in battery charging or motor speed control. The size and spacing of the plates will also depend upon the ambient temperature and the time cycle of operation.

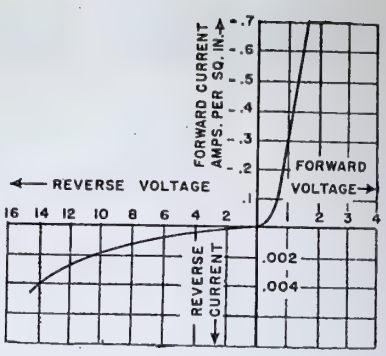


FIGURE 1—D. c. forward and reverse characteristics for selenium rectifiers. Note that the reverse current and voltage are plotted to a different scale from the forward resistance, thus, accentuating the differences.

In general, for design purposes, a stack is considered as under continuous use if it is in operation for fifteen minutes or more at a stretch because during this time the stack will reach its maximum temperature. However, if it is on and off during a period of less than fifteen minutes, smaller plates may be used. Therefore, it is essential to specify the exact time cycle.

Other factors which affect stack design are the number of plates in a stack. Where, in a stack, cooled by natural convection, only a few plates are assembled, as for instance two or four, the plates may be rated at a higher current capacity than when assembled in larger stacks of say twenty plates because in the smaller stacks air circulates more freely around the plates. Under forced cooling, plates may be conservatively rated at two and a half times normal rating.

When stacks are used with forced ventilation it is essential to design the circuit in such a manner that if the circulation of air should be stopped for any reason, that the supply of current to the rectifier should also be interrupted. If this is not done the stack will quickly overheat and be ruined.

OPERATION

As in all types of rectification, stacks may be supplied for half-wave, center tap, and bridge circuits and each in turn for single- or three-phase rectification. Where considerable power is involved three phase rectification is to be desired because, besides balancing the circuit, it operates at a higher efficiency. In single-phase circuits, with resistive load, it is not unusual to obtain an efficiency of 62 per cent, whereas for battery charging the efficiency may be as high as 75 per cent. Three phase circuits, on the other hand, regardless of application, may approach 85 per cent.

In considering three-phase application, however, it should be remembered that the half-wave circuit is not as efficient as

TABLE 2—Selenium plate rating of the various types of Seletron rectifiers manufactured, for single- and three-phase currents, by the Radio Receptor Company, Inc. (Wide-spaced ratings are applicable to normal-spaced stacks of less than five plates. For fan cooling—120 F. P. M.—multiply the normal-spaces ratings by 2.5). (Data of the Radio Receptor Company, Inv.)

Type Number	Plate Size	Plate Spacing	Maximum Plates Per Stack**	Continuous D.C. Amperes at 35°C. Ambient					
				Single Phase*		Three Phase			
				Half Wave	Bridge or Center Tap	Half Wave	Bridge	Center Tap	D.C. Valve
A	1"	Normal	36	.075	.15	.20	.225	.27	.12
WA	Diameter	Wide	28	.11	.22	.29	.33	.4	.17
B	1⅜"	Normal	36	.15	.30	.40	.45	.55	.23
WB	Diameter	Wide	28	.23	.45	.60	.67	.82	.34
C	1⅜"	Normal	40	.30	.60	.80	.90	1.1	.45
WC	Diameter	Wide	28	.39	.78	1.0	1.1	1.4	.58
D	2½"	Normal	40	.60	1.2	1.6	1.8	2.2	.90
WD	Diameter	Wide	28	.78	1.6	2.1	2.4	2.8	1.2
E	3⅜"	Normal	40	1.2	2.4	3.2	3.6	4.5	1.8
WE	Diameter	Wide	28	1.5	3.1	4.1	4.6	5.8	2.4
F	4¾"	Normal	40	2.0	4.0	5.3	6.0	7.5	3.1
WF	Diameter	Wide	28	2.6	5.2	6.9	7.8	9.7	4.0
G	4½"x5"	Normal	28	3.0	6.0	8.0	9.0	11.3	4.7
WG		Wide	20	3.7	7.5	10.0	11.3	14.1	5.9
H	5"x5¾"	Normal	28	4.0	8.0	10.6	12.0	15.0	6.2
WH		Wide	20	5.0	10.0	13.2	15.0	18.0	7.5

* Single-phase current ratings are for resistive or inductive loads. Ratings for battery or capacitive loads are 80 percent of the values shown above. Maximum reverse R.M.S. volts to the plate, 24 volts.

** Where vibration is present, maximum plates to the stack for all sizes is 16.

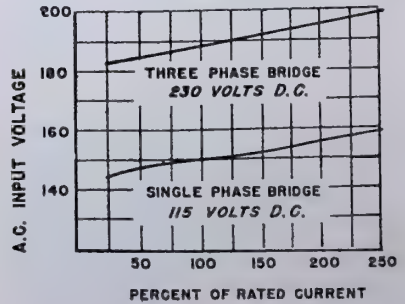
GENERAL CHARACTERISTICS OF RECTIFYING EQUIPMENT

TYPE OF RECTIFIER	POWER RATING	OPERATION	MAINTENANCE	NOTES
Dry-disc	From milliwatts to 20 kw	Rectifying action takes place at metallic junction to provide current flow in one direction only.	Very little.	No moving parts. Quiet in operation. No warm-up time necessary. Wide range of currents and voltages possible by series or parallel group of stacks.
Hot-cathode	From milliwatts to 40 kw	Unidirectional current flows from heated filament to plate only.	Tube replacements from time to time.	Current output ranges from 0.125 to 20 amperes. Warm-up times vary from 10 seconds to 5 minutes. Operation quiet. No moving parts. Vertical mounting often necessary.
Igniter-tube	From milliwatts to 120 kw	Unidirectional current flows from graphite anode to mercury pool through controlled ionization of mercury vapor.	Maintenance of cooling water supply essential to safeguard tubes. Replacement of electrodes or tubes from time to time.	For heavy surge current applications as control of spot and seam welders. Auxiliary starting apparatus necessary.
Motor-generators	From 20 watts to 150 kw	Direct current generator driven by single-phase or three-phase motor.	Same as for other rotating equipment.	Voltage regulation good. Output voltage easily controlled.

the full-wave circuit. The stack, for half wave, will probably be less expensive than for full wave. While the transformer will be more expensive, the total over-all cost will have to be considered. In designing equipment for sizable power applications the difference in sales price of the equipment for half wave as against full wave should be balanced against possible differences in the purchaser's power bills. This may result in the sale of a more expensive piece of equipment initially, but result in an over-all saving to the purchaser. Individual cases should be considered with these points in mind.

The demand for rectifier stacks is so varied as to currents, voltages, temperatures, and circuit applications that in general, it is not practical for manufacturers to carry stacks in stock. However, the individual plates are available for ready assembly into a great variety of series and parallel plate arrangements as needs may dictate.

FIGURE 2—A. c. input voltage for typical selenium rectifiers. The Seletron voltage drop is determined by the number of series rectifier plates and the drop across each plate, as revealed here in this graph.



VOLTAGE CHARACTERISTICS

During the first 10,000 hours of operation rectifiers age to a certain degree. During this period the forward and reverse resistances increase gradually after which time they become stabilized. In some applications this increase in resistance, with a corresponding drop in d.c. output voltage, may be ignored while in other cases it may be necessary to compensate for it by a 5 to 10 per cent increase in the a.c. input voltage.

Voltage regulation varies from approximately 15 per cent with new stacks to 20 per cent when aged. The use of cooling fins or forced air cooling may increase the regulation to 25 per cent. Figure 3 shows the variation of output voltage with current changes for a typical single-phase bridge rectifier.

The a.c. input voltage to be applied to Seletron selenium rectifiers for a given d.c. output voltage is governed by the circuit arrangement, the type of load, and the voltage drop. Various rectifier circuit arrangements, approximate wave shape, and circuit factors involved for resistive or inductive loads are shown in Figure 4. The Seletron voltage drop is determined by the number of series rectifier plates and the drop across each plate. Curves are given in Figure 2.

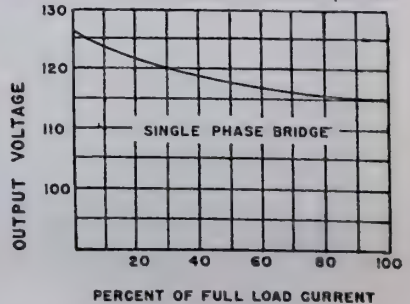
SIZE AND RATINGS

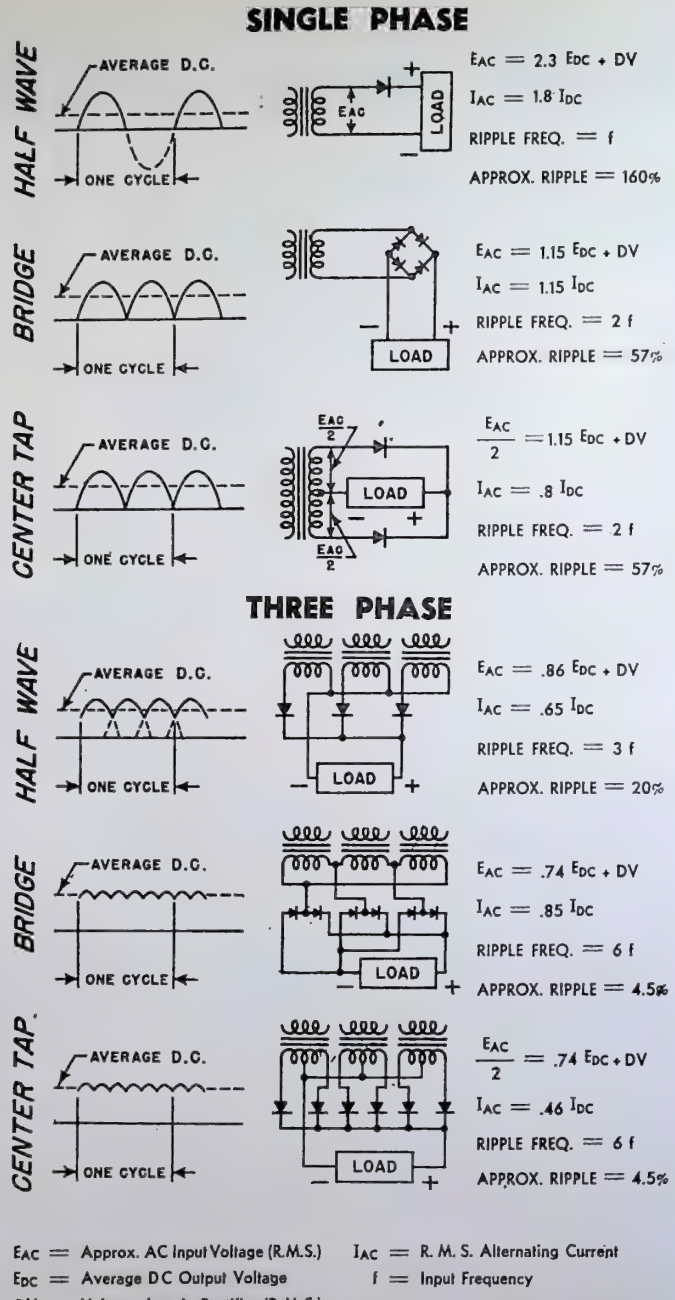
Sizes and ratings of the Seletron selenium rectifier are shown in Table 2, and corresponding circuit arrangements in Figure 4. Plates with normal spacing are designated without a prefix letter. Plates with wide spacing are designated W. Ratings are purposely conservative to assure long life and satisfactory service.

With respect to the various types of dry-disc rectifiers, wherever weight and size are factors, selenium rectifiers should prove most advantageous in most cases. Tests indicate the following relative weights at 1 ampere output: Selenium, 1; magnesium copper sulphide, 1.4; copper oxide, 3.4. In addition, sulphide cells seem to have a shorter life than selenium cells as well as seeming to be definitely limited to low voltage use.

Selenium excels as against both magnesium copper sulphide and copper oxide cells in having a much higher reverse voltage. The oxide runs about one-quarter that of selenium. This means that where voltages over 6 volts are involved, the selenium, by virtue of this higher reverse voltage, will require fewer plates almost certainly resulting in a lower price in addition to lower weight and volume. The forward drop is ap-

FIGURE 3—The variation of output voltage with current changes for a typical single-phase bridge rectifier. The use of cooling fins or forced air may increase the regulation of the rectifier to about 25 per cent.

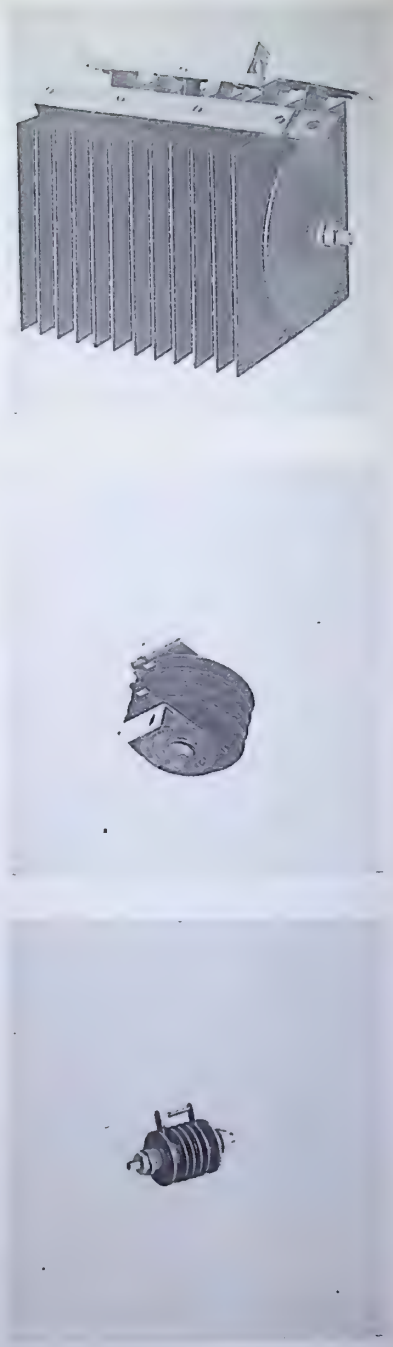




E_{AC} = Approx. AC Input Voltage (R.M.S.)
E_{DC} = Average DC Output Voltage
DV = Voltage drop in Rectifier (R.M.S.)
I_{DC} = Average Direct Current Output
I_{AC} = R. M. S. Alternating Current
f = Input Frequency

$$\% \text{ RIPPLE} = \frac{\text{RMS AC RIPPLE COMPONENT}}{\text{AVERAGE DC VOLTAGE}}$$

FIGURE 4—The six common circuits in which selenium rectifiers are used, shown here together with approximate wave spaces under resistive load, ripple frequency, ripple change, and the approximate a.c./d.c. ratio. Included in the calculations are the approximate a.c. input voltage, the average d.c. output voltage, the voltage drop in the rectifier, the average d.c. output, the R.M.S. alternating current, and the unput frequency of these rectifiers.



THREE TYPES of selenium rectifier stacks are shown in these pictures. The use of stacks of various sizes, alone and in combinations, makes for versatility in creating proper rectifying equipment for the job.

proximately the same in both oxide and selenium types.

For other general characteristics of rectifying equipment, see the special table.

CONCLUSION

Besides the high efficiency, long life, and low weight of selenium rectifiers using aluminum plates, they have the advantage of being instantly ready for use at any time, as they need no warming up period. Also their efficiency is uniformly high over a wide load range and they involve no standby losses when not under load. In addition, they have the favorable feature of almost 100 per cent power factor.

There is no hard and fast rule by which it may be decided where selenium rectifiers may best be applied from an electrical, mechanical, and economic standpoint. As already indicated the increasing demand for, and use of, selenium rectifiers, especially those incorporating the use of the aluminum base plate, indicates a general wider field in which they are proving advantageous.

The Carbon Side of Projection Lighting

And Pictorial Presentation of Arc Lamps With Recommended Carbon Trims for Each

The carbon arc has, with the possible exception of the newly developed concentrated (zirconium) arc, the greatest unit-area brightness of any artificial light source known. In adapting the carbon arc to use in the projection of motion pictures, several modifications have been developed in both the carbons and the lamps in which they are used.

In the projection of motion pictures, it is highly desirable that all portions of the screen be equally illuminated. To accomplish this, an evenly distributed field of light must pass through the aperture plate onto the adjacent film. The crater of the carbon arc is readily focused on the aperture plate in a beam of uniform intensity.

No other source of light compares with the carbon arc in its adaptability to the problems of projection. Its flexibility permits the light to be increased by increase of current when dark or colored films are being shown and decreased by lowering the current when less illumination is required. In electrical efficiency the carbon arc likewise stands supreme. It already occupies the field of theatre projection to the practical exclusion of all other light sources, and recently developed projection lamps of low amperage and simplified operation promise to extend the use of the carbon arc into school rooms, lecture halls, and small auditoriums for which the smallest arc lamps heretofore available provide a much greater volume of light than is required.

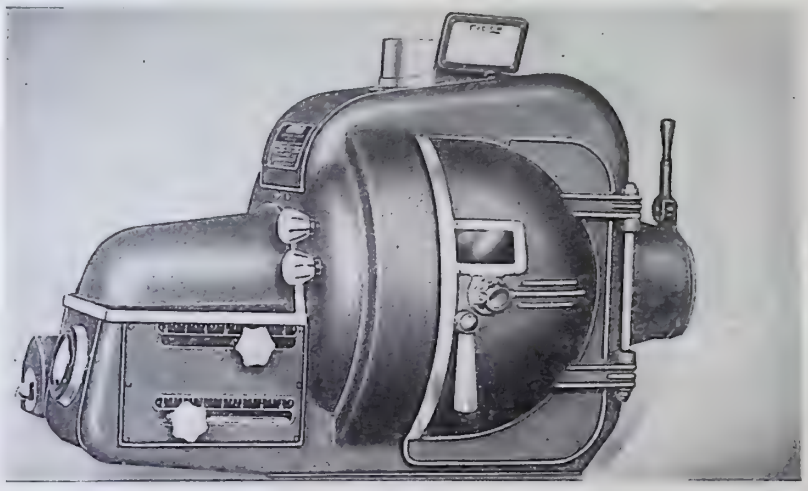
The following brief consideration of projection lighting from the standpoint of the carbons has been condensed from material supplied by the National Carbon Company, with the examples of carbon longevity compiled from authentic sources on file in the Editorial Office.

ON CARBONS IN GENERAL

The plain carbon arc, equipped with solid carbons and operating on direct current, is the original and simplest type of arc lamp. In the old, d.c., low-intensity projection lamps, solid carbons were replaced by neutral cored carbons on the positive and, in some cases, on the negative side. The light from the plain, d.c. arc comes almost entirely from the crater of the positive carbon.

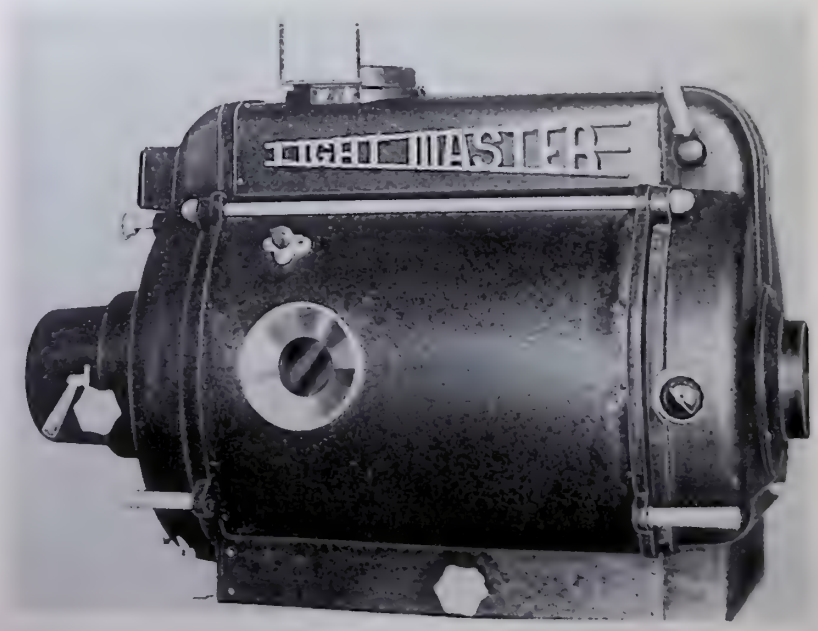
With high current and carbons of large diameter needed to obtain the required volume of projection light from the old-type. d.c., low-intensity arc, the use of solid carbons would permit the arc stream to shift from point to point over the crater of the positive carbon, producing a flickering light. This tendency is reduced by making the carbons in the form of a thick-walled tube with the central opening filled with a softer core of neutral carbon. The effect of this core is to stabilize the arc stream at the center of the positive carbon tip, producing a light of greater steadiness. Further improvement is effected by substituting a metal-coated negative carbon, considerably smaller in diameter than the positive, for the plain negative carbon formerly used, which was equal to or near the diameter of the positive.

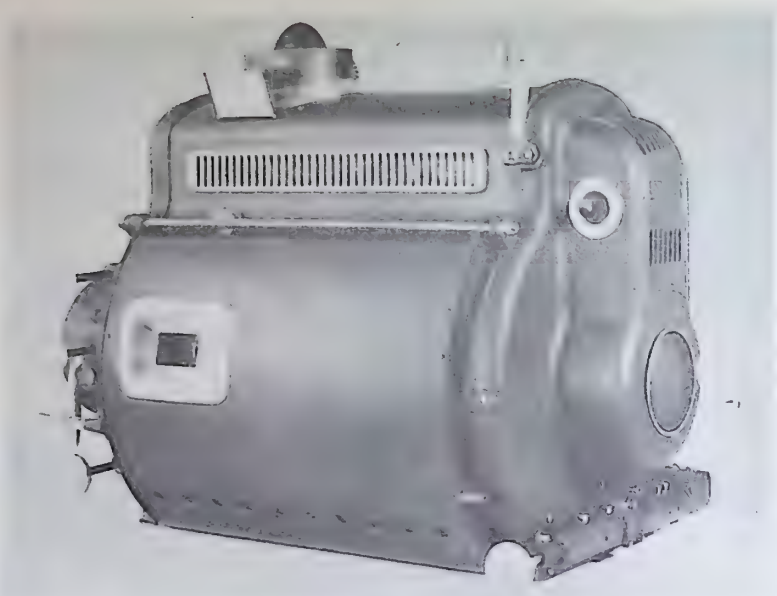
As the motion-picture industry developed, increases in size of theatres, length of throw, and dimensions of screen re-



ASHCRAFT CYCLEX, manufactured by C. S. Ashcraft Manufacturing Company, operates on 58 to 65 amperes. Positive and negative carbons are 7-mm. by 14-inch Suprex or ACHI.

BALLANTYNE LIGHTMASTER, manufactured by the Ballantyne Company, operates on 40 to 50 amperes at 27 to 35 volts. Positive carbon is 7-mm. by 14-inch, negative carbon 6-mm, by 9-inch.



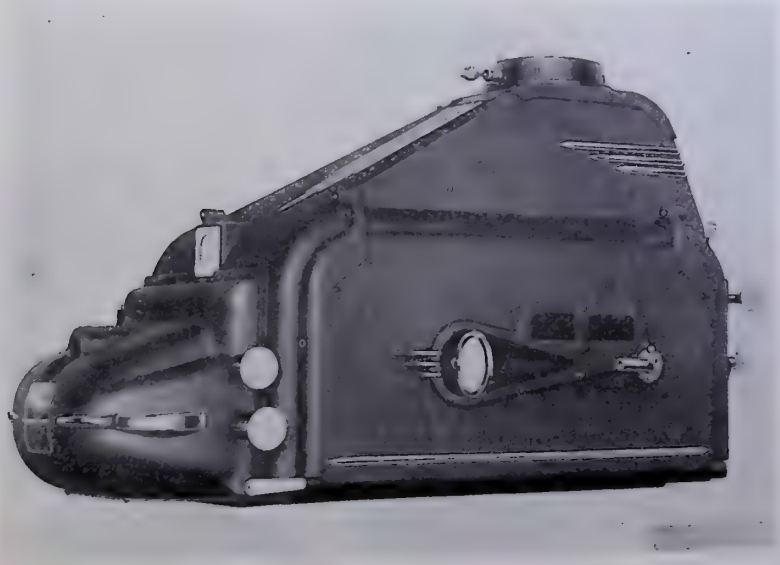


PEERLESS MAGNARC, manufactured by J. E. McAuley Manufacturing Company, operates on 40 to 42 amperes (27 to 28 volts) with a 7-mm. positive and 6-mm. Orotip C negative carbon; on 42 to 50 amperes (31 to 40 volts) with a 7-mm. positive and a 6-mm. negative; on 56 to 65 amperes (31 to 40 volts) with an 8-mm. positive and a 7-mm. negative; and on 70 amperes (40 volts) with 8-mm. positive and negative specials.

ASHCRAFT TYPE D, manufactured by C. S. Ashcraft Manufacturing Company, operates on 58 to 65 amperes. Positive carbon is 8-mm. by 14-inch Suprex, with negative carbon a 7-mm. by 9-inch Orotip. For 45 to 50 ampere operation, the trim is 7-mm. by 14-inch Suprex positive and 6-mm, by 9-inch Orotip negative.

ASHCRAFT TYPE E, manufactured by C. S. Ashcraft Manufacturing Company, operates on 40 to 50 amperes. Positive carbon is 7-mm. by 14-inch Suprex, with negative carbon a 6-mm. by 9-inch Orotip.

PEERLESS HY-CANDESCENT, manufactured by J. E. McAuley Manufacturing Company, operates on 120 to 130 amperes (66 to 70 volts) with a 13.6-mm. by 22-inch standard high intensity positive and a 7/16-inch by 9-inch copper-coated, cored negative. An alternate, with 125 to 150 amperes (68 to 78 volts), has 13.6-mm. by 22-inch new high intensity positive and 7/16-inch by 9-inch copper-coated, cored negative (from 130 to 150 amperes, use a ½-inch by 9-inch negative). For 170 to 180 amperes (72 to 75 volts), the standard super trim is a 13.6-mm. by 22-inch super high intensity positive and a ½-inch by 9-inch heavy duty, copper-coated, cored negative. A new super trim, for 170 amperes (75 volts), is a 13.6-mm. by 22-inch new super high intensity positive and a ½-inch by 9-inch heavy duty, copper-coated, cored negative.



sulted in demands for more and more light from the arc. To meet this need for an enormous volume of projection light, the high-intensity arc was developed.

In the early days, it was common practice to use a large diameter regular solid or cored projector carbon in the lower, or negative, holder. In some cases, a negative carbon slightly smaller in diameter and the positive carbon was used; whereas in others the negative carbon was the same size as the positive. With negative carbon equal or near the diameter of the positive, it is impossible to hold the arc steadily on one spot. This results in a changing intensity of light on the screen. To overcome this condition, some projectionists shortened the arc to such an extent that the negative carbon obstructed some of the light from the positive crater. Obviously, another means of correcting this condition was necessary. It was found that the application of a metal coating to the negative carbon (increasing the current-carrying capacity so that a 5/16-inch diameter negative, for example, would carry the same current previously requiring the use of 9/16-inch diameter plain carbon) imparted the desired steadiness to the arc.

The need for more light even in the smaller theatres was augmented by various factors such as the use of perforated sound screens, colored films, and the demand for a higher level of general illumination. Carbon manufacturers have endeavored to aid the situation in the smaller theatres by developing low intensity reflecting arc carbons which carry higher current than those previously available. The SRA projector carbons are the result of these efforts.

The improvements embodied in SRA projector carbons make possible a steady arc at higher currents than are permissible with regular low-intensity carbons. Low-intensity d.c. arcs are operated at current densities of 120 to 165 amperes to the square inch in the positive carbon. With SRA carbons, current densities up to 205 amperes to the square inch are reached. In the high-intensity arc, however, current densities of 500 to more than 800 amperes to the square inch are obtained. This extreme current density requires a highly developed type of carbon of the greatest possible purity and the resulting arc is quite different from that of the low-intensity types.

The large high-intensity projection lamps, developed to meet the needs of the larger theatres, cannot be used with economy in theatres of small and intermediate size. There is evident need, however, in theatres of the latter class, for a projection light of better quality, higher intrinsic brilliancy, and greater volume than the low-intensity, d.c. is capable of providing. To meet this need, the principle of the high-intensity arc has been extended to arcs of lower power demand which bridge the wide gap between the low-intensity d.c. arc and the high-intensity d.c. arcs previously available. These later high-intensity arcs use smaller-diameter, copper-coated, carbons, can be operated in lamps of simpler construction, and have been adapted to a.c. as well as d.c. operation.

The high-intensity arcs, the a.c. high-

intensity arc, and the Suprex-type d.c. arc give best projection within a relatively narrow range of arc position. This requires a control mechanism adapted to maintaining the position of the arc within these limits and, in the case of the Suprex-type lamps, providing a fairly wide range of positive-to-negative feed ratio. This result is very effectively accomplished by most of the lamps now on the market so that the projectionist, with reasonable attention, should encounter no difficulty in maintaining proper operating conditions at the arc.

In the design of new lamps, both a.c. and d.c., advantage has been taken of the fact that the brilliant gas ball from which the light emanates projects somewhat beyond the lip of the crater. As a result, the light of 90 degrees, that is, at right angles, to the trim, is much brighter for these high-intensity arcs than for the low-intensity arc where the highest brilliancy is confined to the crater floor. This fact, together with the development of a projection lens accepting a much wider cone of light than was formerly possible, has led to the use of reflectors having a larger angle of light pick-up than those used in the low-intensity, d.c. mirror arc lamps.

It is evident that the needs of the smaller theatres for projection light of higher intensity and better quality have been met effectively and efficiently by the a.c. high-intensity and Suprex-type arcs. Screen illumination 60 to 200 per cent greater than that obtainable from the low-intensity arc has been provided. The increase in operating cost is so small that it is readily absorbed by improved patronage which high-intensity projection and a more comfortable level of general illumination attract.

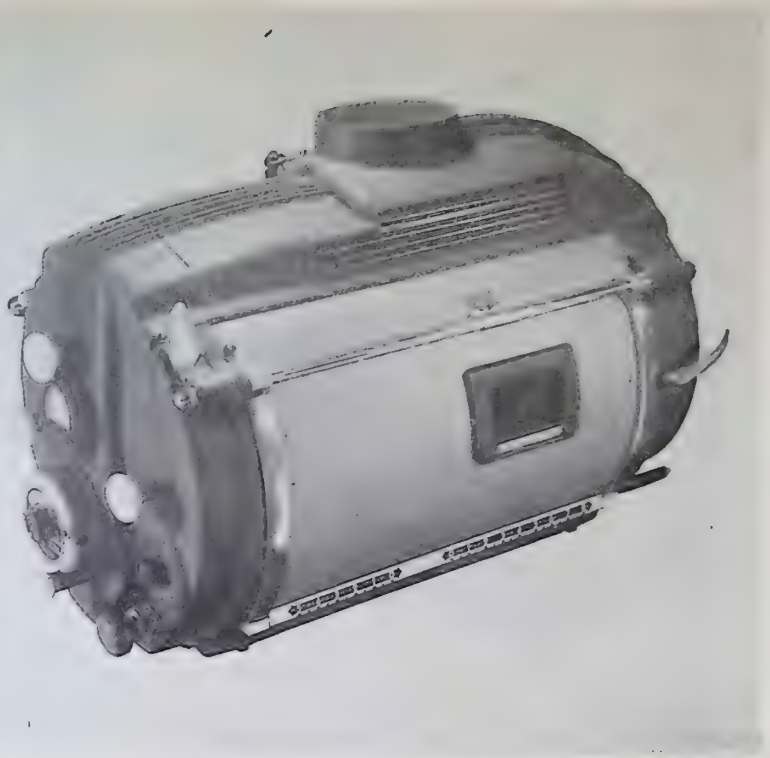
OLD TYPE D.C., L.I. LAMPS

The old-type, d.c., low-intensity carbon-arc lamp was the first type of lamp used in motion-picture projection. The positive carbon is mounted above the negative and slightly inclined from the vertical position, so as to expose the crater and permit a greater portion of the crater light to be picked up by the condenser lens.

The optical principle of the old-type, d.c. low-intensity projection lamps is that of a cone of illumination, approximately 45 degrees in diameter, picked up by the condenser lens and focused on the aperture plate.

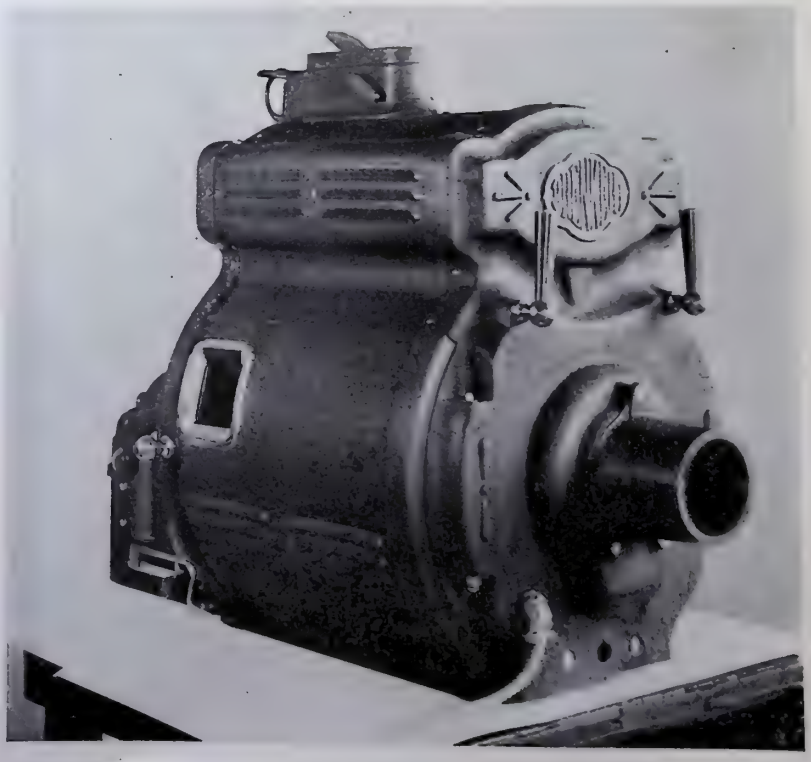
The positive carbon used in this type of lamp is always cored. While the brilliancy of that portion of the crater occupied by the core is a little lower than that of the surrounding solid carbon, this slight disadvantage is more than offset by the greater steadiness given to the arc. In fact, it would be impossible to produce a light of sufficient steadiness for satisfactory projection with solid positive carbons.

Since all of the light that is useful for projection in this type of lamp comes from the crater of the positive carbon, it is essential that the adjustment of the carbons, as they are consumed, be such as to maintain the positive crater in a fixed position where it can be accurately focused on the aperture plate. Likewise, it is essential that the arc stream should not wander from point to point, but should impinge upon the positive carbon in a steady position.



MOTIOGRAPH UTILITY HIGH, sold through Motiograph, is a 1-kw. lamp, trimmed with a 7-mm. positive and a 6-mm. negative carbon.

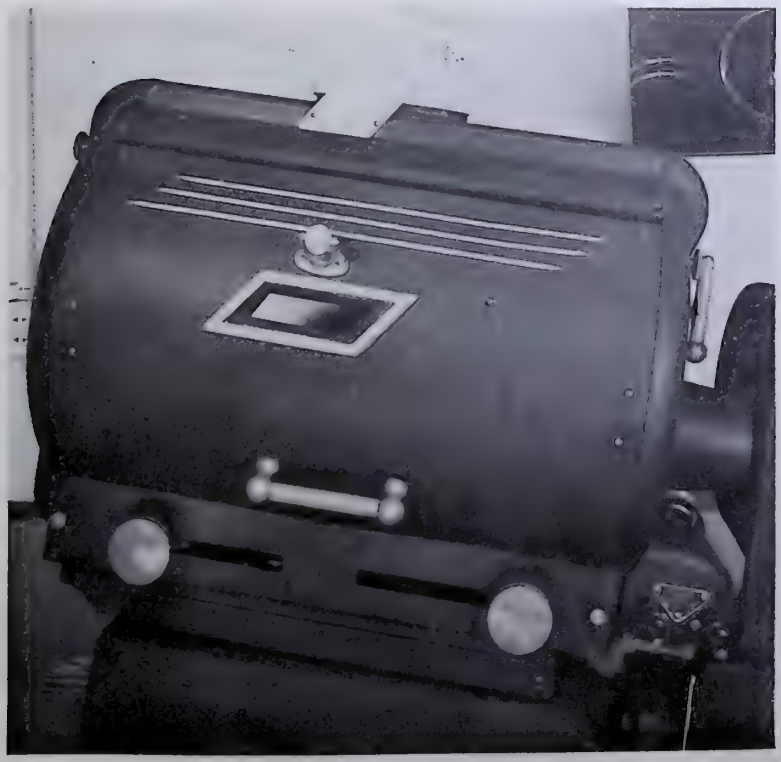
RCA BRENKERT ENARC, manufactured by the Brenkert Light Projection Company, operates on 42 to 50 amperes, with 7-mm. positive and 6-mm. negative carbons. At 60 to 70 amperes, an 8-mm. positive and a 7-mm. negative carbon is used. All carbons are copper coated.



RCA BRENKERT RADARC, manufactured by the Brenkert Light Projection Company. No information available on recommended carbon trim for the new 1-kw. lamp.

RCA BRENKERT MODEL A SUPER HIGH INTENSITY, manufactured by the Brenkert Light Projection Company, operates on 120 to 170 amperes, with a 13.6-mm. positive carbon and either a 7/16-inch or a ½-inch copper-coated negative carbon.

RCA BRENKERT SENARC 1-KW., manufactured by the Brenkert Light Projection Company, operates at 41 to 43 amperes, with a 7-mm. positive and a 6-mm. negative carbon. Both are coated.



D.C., L.I. REFLECTOR ARCS

The develpment of the d.c. reflector carbon-arc lamp, operating at currents from 10 to 42 amperes, represents such a striking improvement in efficiency over the old type, low-intensity d.c. lamps that it has largely replaced them in theatres.

There are two general types of low-intensity reflector lamps. One has both the positive and negative carbons held in a horizontal position (the type used in this country) and the other with the positive carbon set horizontally and the negative at an angle of 75 degrees from the horizontal (the type quite popular abroad). In both types, the positive carbons face a mirror against which the light is thrown and reflected toward the aperture plate.

The positive carbon used in the regular low-intensity reflector arc lamp trim is slightly larger in diameter than the negative, and should burn with a cup-shaped crater.

A typical low-intensity d.c. arc has a trim comprising a 12-mm. by 8-inch SRA positive and an 8-mm. by 8-inch negative. The average length of life of the positive carbon is 2.26 hours, and that of the negative carbon 2.75 hours. Under the arc conditions of 32 amperes at 55 volts, a 250-carbon case of positives should last 565 hours and a similar case of negatives 687.5 hours.

A.C., L.I. LAMPS

Direct current possesses definite advantages over alternating current as a source of power for projection. The principal reason for this is that the d.c. arc affords, in the crater of the positive carbon, a brilliant source of light, approaching pure white in color, easily focused on the aperture plate and representing a large proportion of the total light emitted from the arc. The a.c. arc between two neutral cored carbons, on the other hand, affords less than half as much usable light as the d.c. arc of equal electrical input, and the color is more yellow, due to the lower temperature of the carbon tips.

There are cases, however, where it is not practicable or economical to use any of the usual methods of converting a.c. to d.c, and the resulting need for an efficient a.c. arc led to the development of special projector carbons. As previously described, an arc-supporting material was added to the core of these carbons to produce a flame-like arc stream of pure white color. The condensing lens of the a.c. projector lamp focuses on the aperture plate some of the light from this luminescent arc stream, as well as the light from the incandescent tip of the carbons. An efficient projection light of excellent color quality is thus provided from an a.c. circuit. The arc-supporting material in the core of these projector carbons also practically eliminates the noise which is characteristic of the a.c. arc between neutral cored carbons.

In some a.c. projection lamps, the positions of both upper and lower carbons is fixed, but, where adjustment is possible, it is recommended that the upper carbon be set at an angle of 20 degrees from the vertical and the lower one held in a vertical position.

In the case of the so-called "one kilowatt" a.c. arcs—such as the Ashcraft Cyclex lamp—using a trim of 7-mm. by 14-inch Suprex carbons, the length of life of the carbon decreases with the increase in the amperage and voltage. At 52 amperes and 18 volts, the carbons average 4.17 hours of life (or 1,042.5 hours to the case). At 59 amperes and 20.5 volts, the length of life averages 3.47 hours (or 867.5 hours to the case). And at 66 amperes and 22 volts, the average length of life of a single carbon is 2.78 hours (or 695 hours to the case).

SUPREX-TYPE H.I. ARCS

The Suprex arc type of light source has taken its place in bridging the gap between the low-intensity and the larger high-intensity arcs. This new type of d.c. arc employs a series of high-intensity carbons smaller in diameter and operating at lower arc currents than have hitherto been used for high-intensity projection. The carbons have been designed so that, with a few simple precautions, the positive carbon does not need to be rotated and the negative carbon can be coaxial with the positive. the carbons are protected from oxida- . . . electrical resistance is reduced by a copper coating which makes it impracticable to hold these carbons any convenient distance from the arc. These carbons burn with the same crater formation, and give the same brilliant snow-white light on the screen as the larger, uncoated, high-intensity d.c. carbons.

The carbons in the Suprex-type lamps are both held in a horizontal position, and the magnetic field, resulting from the current through the carbons, is of equal strength on all sides. The tail flame of the arc, therefore, surrounds the positive crater in almost uniform layer. This condition lacks stability and slight disturbances may cause the crater to burn off on one side and produce a noticeable change in the light on the screen. In some of these lamps, an auxiliary magnetic field has been introduced which augments the magnetic flux below the arc and opposes that above it. This gives the tail flame a definite upward trend and assures greater stability to the position of the arc stream and the form of the crater. The axis of the negative carbon is placed slightly below that of the positive to compensate for the angular direction of the arc stream.

The improvement in the steadiness of screen illumination resulting from the use of this auxiliary magnetic flux is very noticeable, especially when the lamp is operated from a 115-volt line through a large ballast resistance.

With a suitable source of power and proper adjustment of the control mechanism for the conditions under which the arc is operated, these Suprex-type d.c. high-intensity arcs supply to the smaller theatres all the advantages of light quality and intensity which the higher amperage high-intensity lamps have given the larger theatres. They produce 100 to 200 per cent higher levels of screen illumination than is available from the low-intensity, d.c mirror arc and at a lower operating cost to the unit of light volume.

In the "one kilowatt" d.c. arcs—such as Simplex High Strong Utility, and

SIMPLEX HIGH, 1-KW, TYPE 19000, sold through National Theatre Supply, operates at 40 to 50 amperes, with a 7-mm. positive Suprex and a 6-mm. negative Suprex carbon.

STRONG JUNIOR HIGH, TYPE 21600, FOR 35-MM., manufactured by the Strong Electric Corporation (for portable projectors), operates on 40 to 42 amperes and 29 volts, with a 7mm. by 12-inch positive copper-coated carbon and a 6-mm. by 9-inch negative carbon.

STRONG UTILITY HIGH, TYPE 14050, 1-KW., manufactured by the Strong Electric Corporation, operates at 40 to 50 amperes, with a 7-mm. positive Suprex and a 6-mm. negative Suprex carbon.

STRONG JUNIOR HIGH, TYPE 21000, FOR 16-MM., manufactured by the Strong Electric Corporation, operates on 30 amperes, with a 6-mm. by 8½-inch positive and a 5½-mm. by 6-inch negative carbon. (Special carbons for this 16-mm. lamp are marketed under the trade name, Pearlex.)

STRONG UTILITY LOW, TYPE 14550, manufactured by the Strong Electric Corporation, operates up to 20 amperes, with 10-mm. low-intensity positive and a 7-mm. negative carbon. From 20 to 32 amperes, the trim is a 12-mm. positive and an 8-mm. negative carbon.

Brenkert Sennarc lamps—there is used a trim represented by a 7-mm. by 14-inch Suprex positive and a 6-mm. by 9-inch Orotip negative. When arc amperage is 40 and arc voltage is 27.5, average length of life for positive carbon is 2.23 hours and that of the negative 2.27 hours, which, respectively translated to the basis of the 250-carbon case, becomes 557.5 and 567.5 hours.

For the simplified high intensity d.c. arcs, four trims are used, depending on the amperage and voltage supplied the arc. For 42 amperes and 32 volts, the trim is a 7-mm. by 14-inch Suprex positive and a 6-mm. by 9-inch Suprex negative. Under these conditions, the average length of life is 1.85 hours for the positive and 1.88 hours for the negative, which means that a case of positives should burn for 462.5 hours and a case of negatives for 470 hours. Using the same trim, but with 50 amperes and 36 volts to the arc, the life-lengths are 1.10 for the positive and 1.62 for the negative, with the figures for a case lot being 275 hours for the positive and 405 hours for the negative.

Increasing the quality of the juice to 56 amperes and 31 volts, the carbon diameters are increased slightly, to a trim composed of an 8-mm. by 14-inch Suprex positive and a 6.5-mm. by 9-inch Suprex negative. Here the average length of life is 1.56 hours for the positive and 1.68 for the negative. Under these conditions, a case of positives should last 390 hours and a case of negatives 420 hours. An increase to 65 amperes and 36 volts supplied to the arc, while still using the 8-mm. by 14-inch Suprex positive, would utilize a 7-mm. by 9-inch negative. Here the life-length of the positive is but 0.90 hour, and that of the negative 1.77 hours. A case of each, then, should last 225 hours for the positive and 442.5 hours for the negative.

The so-called high-low arc lamp operates with a trim comprising a 9-mm. by 20-inch High-Low positive and a 5/16-inch by 9-inch Orotip negative. With 75 amperes and 56 volts supplied the arc, the length of life of the positive is 1.18 hours and, for the negative, 2.12 hours. The 250-carbon case, then, should last, for the positive, 295 hours and, for the negative, 530 hours.

H.I., D.C. ARCS, WITH ROTATOR

In the larger theatres, the demand for increased projection light has become so great that, at the present time, only the high-intensity, d.c arc can supply the extreme concentration of light necessary to provide the required screen illumination. It, therefore, seems desirable to describe this lamp and to call attention to certain characteristics of high intensity arcs which may help in the solution of the ever-present problem of increasing useful light.

The light from a high-intensity arc emanates from two distinct sources, the crater and the tail flame. The tail flame produces about 30 per cent of the total light from this type of arc, but is no value for projection because it cannot be focused on account of its large size, shape, and position.

The very high intrinsic brilliancy of the high-intensity arc is attained by adjusting the position of the negative car-

bon so that the negative arc stream compresses or confines within the crater of the positive a substantial portion of the brilliantly luminescent vapors emanating from that point. This produces a snow-white light of very high candle power, much brighter than it is possible to obtain from incandescent carbon alone.

In the condenser-type, high-intensity arc lamp, the positive carbon is held in a horizontal position with its crater directly facing the condenser assembly. Since the current density in the carbon is very high and the high efficiency of this type of arc is dependent on the maintenance of a well-formed, cup-like crater, the positive carbon is allowed to project but a short distance from the holder and is rotated continuously while the arc is burning. The negative carbon is set at an angle to the positive, usually 40 degrees to 60 degrees below the horizontal.

In most commercial lamps the angle formed by the axis of the two carbons is fixed. It is well known, however, that the relative position of the two carbons along their respective axes appreciably affects the behavior of the high-intensity arc. In both the condenser and reflector type, it is important that positive and negative carbons be in the same vertical plane, that is, that they be accurately aligned in a lateral direction. It is also important that the positive crater be maintained at the position indicated by the lamp manufacturer. If it is found that a more desirable screen illumination is obtained with the tip of a positive carbon in a different position than that indicated by the gauge pin or arc image chart, the reason will probably be found in the displacement of the condenser assembly or reflector from its correct position.

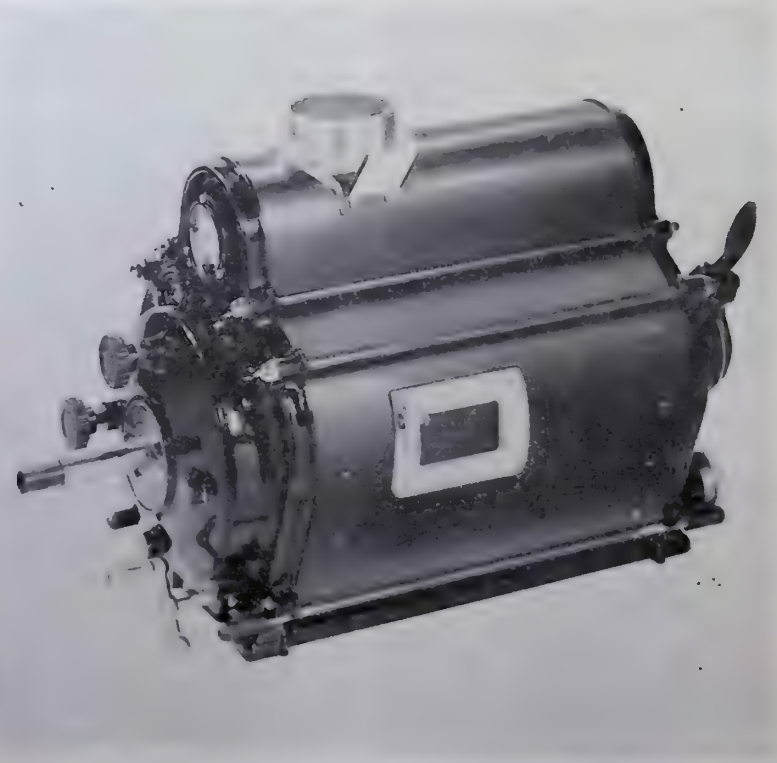
The feeding mechanism is designed to advance both carbons as they are consumed, and should be adjusted to feed the positive carbon forward at the same rate as it is being burned, thus maintaining the crater at a fixed position in relation to the condenser and to the point of intersection with the axis of the negative carbon. The rate of feed of the negative carbon is also adjustable relative to that of the positive and, when properly adjusted, maintains an arc of uniform length.

High-intensity projection lamps are built for operation at current densities appreciably higher than those permissible with other types of projection lamps. The cone of illumination picked up by the condenser assembly being much greater in angular diameter than in the old type, low-intensity projection lamp, the efficiency of this type of unit is very high and the volume of projection light available is ample to meet the heaviest demands now being made by the motion-picture industry.

The high-intensity, condenser-type arc lamp uses a trim composed of a 13.6-mm. by 22-inch HI positive and a 7/16-inch by 9-inch Orotip negative. When the arc is fed with 125 amperes and 68 volts, the positive carbon has a life-length of 1.36 hours and the negative 2.88 hours. Translated to length of life to the 250-carbon case, the figures are 340 hours for the positive and 720 hours for the negative.

STRONG MOGUL, TYPE 17500, manufactured by the Strong Electric Corporation, operates on 45 to 70 amperes, with either a 7-mm. positive and a 6-mm. negative carbon, or an 8-mm. positive and a 7-mm. negative carbon. Carbons are Suprex.

STRONG PORTABLE, TYPE 5000, FOR 35-MM., manufactured by the Strong Electric Corporation, operates at 15 to 20 amperes, with a 10-mm. low intensity positive and a 7-mm. negative carbon.



Clear, Distinct Sound Should Be Standard

Brief Consideration of Possible Defects In Sound-Reproducing Equipment and Film

LESTER M. ISAAC, M. D. O'BRIEN, and F. W. BOETTCHER
Projection Department, Loew's, Inc.

As stated in another article, the motion picture is Loew's merchandise and must be perfectly presented. This article dealt with visual projection.

It now follows that oral reproduction is so closely aligned and associated with the projected picture that it cannot possibly be separated from it. As in the proper visual presentation of a motion picture, the first consideration in reproducing the sound in the theatres should, of course, be the comfort of our patrons.

Comfortable sound reproduction includes three prime factors: Good intelligibility, even distribution of the sound throughout the theatre and a comfortable volume.

If there is distortion, intelligibility is destroyed. If there is insufficient or too much volume, it tends to destroy the comfort of the patrons and constitutes poor reproduction. Improper distribution has the same effect.

The physical nature of sound reproduction equipment, however, is entirely too complex to discuss in great detail here. When it is realized that we reproduce recorded sound which is thousands of times below the threshold of hearing, and multiply this many times through a highly complicated system of wiring, condensers, filters, and vacuum tubes, it will be readily apreciated that the actual process of keeping this equipment in first class operating condition becomes a matter for thoroughly-trained technicians and competent projectionists.

The purpose of this article then is to point out briefly and simply the results of some of the defects which may occur in the sound reproducing equipment, or the film.

NOISE AND DISTORTION

Some of the commonest causes of noise and distortion in sound reproduction are occasioned by various film conditions or projector sound equipment misalignments. For instance, one type of sound distortion is created by blemishes in the sound track emulsion, such as pin holes, scratches, foreign particles and emulsion cracks. As previously stated, this condition can only be corrected by acquiring a good print.

Several of the misalignment effects, which are heard in sound, can best be described as a "wow," which creates the effect of a waving, tonal wail of a siren, and is normally caused by lack of pressure on the film passing through the sound head. Calling the projectionist's attention to this distortion will serve to rectify this condition.

Another unusual sound distortion emanating from the horns is technically called "flutter," which can best be decribed as a rapid, wobbling effect. Flutter tends to prolong the reproduced sound and is particularly noticeable on individual piano notes as well as on all other musical instruments. Some of the causes of this effect are tight guide roller, tight light gate tension, excessive film loop, hooked sprockets causing back lash in film movement, jerky film take-up adjustment, or a sticking film pad roller or idler.

Another more mechanical type of "flutter" sound is caused by an aged exciter lamp which has outlived its usefulness.

CRACKLING

Perhaps the most common distortion occurring in sound reproductions is a crackling sound, which can be likened to crunching paper effect and can be introduced by several abnormal mechanical conditions. For instance, loose elements in photo cells or vacuum tubes, poor or corroded socket connections, loose wiring or terminal connections. In the same category would be the normal deterioration of resistors, condensers, contacts or open circuits in volume controls or changeover switches—these, of course, would be subject to more thorough investigation and repairing than the projectionists are normally equipped to handle.

If the every effort made by the projectionist and the service engineer to locate the source of the crackling distortion noise meets with no success, one may look for and expect cracked diahpragms in one or more of the high or low frequency loudspeaker units in the horn system behind the screen.

EXTRANEOUS NOISE

A seasonal noise which can appear as distortion in the reproduced sound may be occasioned by vibrations, transmitted by machinery, generating a mechanical vibration which may be misunderstood as emanating from the horn system. For example, starting up the theatre air-conditioning system or fans can generate a sound which was not apparent prior to the starting of this machinery. When such a complaint appears, it is suggested that the management immediately notify the projection department.

Similar mechanical noises sometimes also may be traced to equipment not associated with sound reproduction such as vibrating light fixtures, loose equipment stored near the horn system, and even loose chairs or parts of chairs and other loose miscellaneous equipment in or about the theatre.

Certain theatres are located in close proximity to transit systems such as subways, elevated, or street car lines, or in the immediate vicinity of local construction projects so that rumbling sounds, created by these conditions, will be immediately recognizable by the management as originating outside of the theatre and not attributable to defects in the sound reproducing equipment.

A sudden change of sound volume in your theatre may be occasioned by one of several things, including any defect or maladjustment of the exciter lamp, or its associated circuits, which will immediately tend to change the volume of the running projector. Also in this category are improper exciter lamp adjustment; a change in exciter lamp intensity due to aging of the lamp; exciter lamp-power supply varying due to incoming power service variations, or defective tungar or rectification equipment. An exciter lamp which has been in use beyond its rated useful life tends to blacken from carbon deposits, coating the inside of the glass and reducing the intensity of illumination. It is recomended that such lamps should be replaced in an early stage of such a blackened condition.

CHANGES IN SOUND VOLUME

Lubricating oil seepage into any portion of the sound reproducer optical system such as the lens assembly, the sound lens slit, or prism assembly, will serve to impair the efficiency of the entire sound optical system and, thus, reduce volume at the horns. Such conditions can be rectified by the sound service company. In the event of any of the component portions of the sound optical system appearing out of adjustment, also causing changes in sound volume, notification of the sound servicing company will effect an immediate remedy.

Photo cells which have outlived their usefulness, or improperly adjusted photo cell voltage, or any factor which contributes to a variation of voltage will also create a change in the sound volume.

Among the myriad causes of changes in sound volume (many of which are beyond the control of the projectionists) might be listed, worn or defective switch contacts; deteriorated wiring and terminal connections on volume control equipment; old or defective vacuum tubes; and failure of the more intricate component parts of the amplifiers such as filters, condensers, resistors, transformers and associated controls.

Perhap the most common defect of sound volume changes, however, is occasioned by variations or a drop in the source of incoming electric service, or excessive loads on the building service. This will naturally affect the voltage sup-

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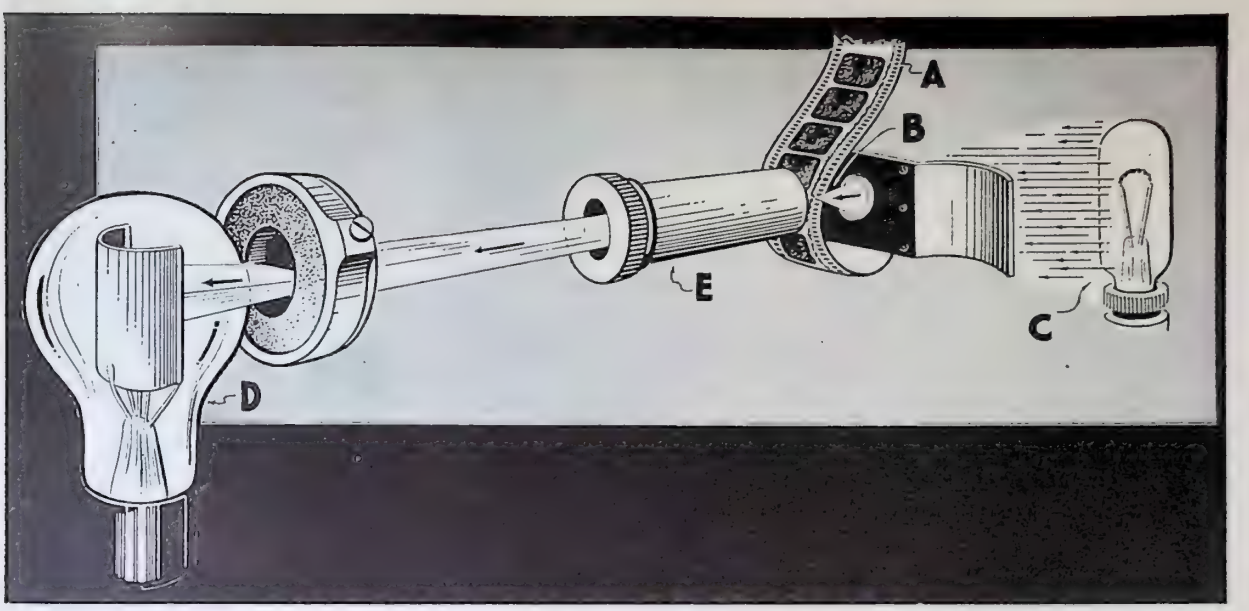


WHY A SOUND TRACK SOUNDS . . . The sound track (A) is photographed on the film print between the picture area and the sprocket holes. This photograph is then passed in front of a slit (B), illuminated by an exciter lamp (C), and focused on a photo-electric cell (D) by a lens (E). This action converts the photograph of the sound track into equivalent electrical pulsations. These pulsations are then amplified, or multiplied, through a system of amplifiers or horns. The series of acts by which the sound is photographed on the film, in the processes of production, is essentially the reverse of that which is described for making the tracks speak.

ply to the entire sound reproducing system, even to the extent of affecting the speed of the projector drive motors with a resultant change of sound pitch.

Certain conditions of sound volume change are also attributable to the effects and mishaps of the horn system and high and low frequency units as, for instance, rupture of one of the high frequency or low frequency unit voice coils, or the blowing of fuses in one or more of the field coil circuits. In order to locate and rectify this condition, it is necessary for the projectionist or sound service engineer to make tests of each individual loudspeaker unit to determine which one is not functioning.

IF YOU HAVE VAUDEVILLE

In some theatres with vaudeville or stage shows which necessitates the moving of the screen horn system off stage, it may be that in repositioning the horn truck or dolly that the horns might not be placed exactly into their original position. This will cause a diminishing of sound volume in certain portions of the theatre and an apparent increase of volume in other portions.

It should definitely be the manager's and the assistant manager's responsibility, at all times, to assume full control of the auditorium sound volume, by instructing the projectionist as to the proper volume control setting desired to maintain the most comfortable and natural sound rendition. It is a physical impossibility for the projectionist, in the high and distant projection room, to judge with any degree of accuracy the size of the audience in the theatre at any given time; nor is it possible for the projectionist to know whether the sound is of sufficient volume for comfortable and even distribution throughout the entire theatre. It is for this reason that the matter of volume control cannot be left to the judgment of the propectionist and must, therefore, become the manager's or assistant manager's sole responsibility.

LOSS OF SOUND

Among the most common causes of loss of sound are power failures, equipment burn-out, projector motor failures, switch failures, the stripping of mechanism and sound head gears, and individual circuit fuse blowing. It should be very readily apparent that a thorough familiarity of the location of all power fuses by all projectionists, as well as the manager, and in a good many cases the house electrician, should be a general prerequisite of good maintenance practice. Therefore, when power failures occur within the theatre the minimum of time would be consumed in replacing burnt out fuses. In the matter of equipment burn-out, a great many circuits in the sound equipment are of such a delicate nature that it often is necessary to make extensive tests with the proper instruments to determine the exact seat of the trouble.

In the case of burned-out tubes, it very rarely requires more than a minute or two for the projectionist to locate and replace such a defective tube. Motor failure, however, is of a more complex nature, particularly when the motor actually burns out as this may require completely replacing a motor—and cannot be accomplished in seconds of time.

IN CASE OF BREAKDOWN

The stripping of gears is also a serious breakdown and sometimes may require considerable time to properly replace and re-align. Switch failure may, or may not be of a serious nature. Some switches may be of such a type that the projectionist can short circuit them out of service without seriously impairing the proper operation of the equipment. Other switches, particularly the changeover switch, volume controls, etc., may require a little longer time to disassemble, adjust, clean and replace.

Of course, in the matter of a serious breakdown, which may entail hours of work to rectify, it may be necessary, in some instances, for the manager to improvise his show in order to satisfy patrons in the audience. In the event of a serious breakdown of one machine, it, of course, will become necessary to operate the show on the one machine if only two projectors are used by the theatre. This will necessitate about a 15- or 20-second wait between reels. If the audience becomes impatient, we feel that a brief explanation by the manager from the stage will restore their patience and good nature.

Cleanliness, of course, is absolutely the first consideration for good sound reproduction, for one of the commonest causes of distorted sound is dirt collecting at the slit of the optical system and distorting the illumination being transmitted through the sound track to the photo cell. This dirt may accumulate through no fault or negligence on the part of the projectionist as it may be deposited by air currents wafting ordinary dust and particularly carbon dust throughout the projection room.

A green print, that is to say a brand new print, which has not been processed, may deposit infinitesimal specks of emulsion at the slit and also interfere with the correct reproduction.

As in the maintenance of the projection machine, the manager should familiarize himself with the projection room spare stock and the correct quantity of replacement parts for immediately servicing minor defects in sound reproduction equipment. This will, of course, include such miscellaneous consumable items as fuses, vacuum tubes, gears, lubricating

oils and greases, exciter lamps, photo cells, indicating pilot and framing lamps, ballast lamps, tungar bulbs and rectifier tubes, and similar items.

If there is any doubt, in the mind of the management, as to the required quantity of spare sound accessories and supplies that are required for the proper maintenance of normal sound, the projection department should be contacted immediately for proper guidance.

In the management's periodical visits to the projection room attention should be paid to the good housekeeping feature of the sound equipment, as well as the projection equipment.

One of the commonest misconceptions of proper reproduction of sound is that music appears to be of a much higher volume than dialogue. This, perhaps, would be a good place to point out the fact that this is exactly the way the sound has been recorded, particularly in musical pictures.

If a comfortable level can be established for dialogue, it is urgently suggested that the music be permitted to take care of itself as the recording engineers in the various studios have so designed the recording of these prints that no change in volume control setting should be necessary. If, in the opinion of the manager, this distinction between the two in a certain movie is abnormal, it is suggested that the projection department be contacted and allowed to examine the particular print, to determine whether or not it may comfortably be run at one constant volume control setting.

HOT PRINTS

Sometimes, in a musical extravaganza you may feel that accent has been placed on volume and you are probably right as in this type of picture the studio may have furnished you with a "hot print," or what is more commonly known as a "high range print." When the studios release this type of print for playdates in the theatres, the projection department is in possession of information on the proper treatment of this print in the matter of setting the volume. It has been the practice of the projection department in the past, when such prints are released, to forward such information to the theatres in the form of a special bulletin.

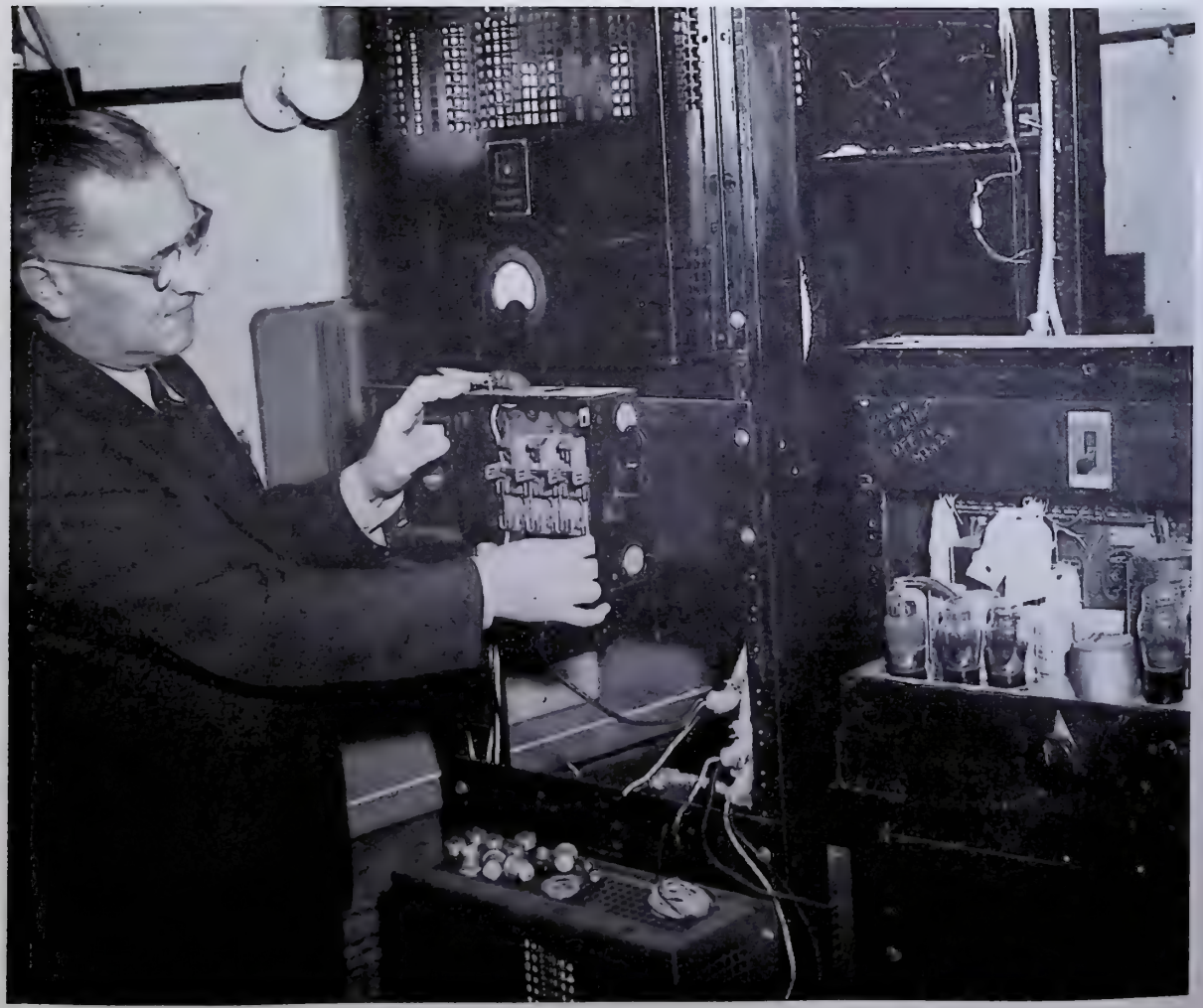
CONCLUSION

It cannot be overstressed that it is the management's problem and responsibility to recognize the effect of poor sound reproduction. The cause and remedy of such effects, however, should be left to those who have made projection and sound servicing their chosen professions.

Good sound reproduction is assumed to be a recognized fact in Loew's theatres. It, therefore, becomes self-evident that the manager or assistant manager should assume the responsibility of recognizing the difference between perfect and defective sound reproduction, without the necessity of having been a graduate of some school of engineering to qualify his judgment.

Above all, the manager and projectionist must always work together for at Loew's Theatres the "show must go on and stay on."

F. WILLIAM BOETTCHER, engineer of Loew's projection and sound department, makes final tests on emergency sound amplifying equipment, preparatory to okaying it for shipment to a Loew's theatre. The home office projection and sound department was faced with many emergencies during the trying war years; but, despite of shortages of material and men, the department compiled an impressive record. The accompanying article is, in part, based on some of the experiences of these trying years, backed up by many, many more years no less trying because continuing war was being waged on the problems and perplexities of sound.



Care of Sound and Projection Equipment

Notes on What Projectionists Should Know To Insure Smooth, Trouble-Free Operation

Even though the shooting war is over, it is a sad but true fact that there is on the market a dearth of new sound and projection equipment. Accordingly, it is even more essential now that every projectionist and theatre man treat his present equipment with all possible consideration, remembering that "mosta o' the besta" is hard pressing the ripe old age of ten years. In the work of maintaining one's present equipment in top-notch condition, no program is more pertinent than that promulgated during the war by the War Activities Committee, and Richard Walsh, president of the IATSE.

In announcing the program, now as valuable as it was then, Walsh said, "Our country is at war. Here's how you can help. Every type of material is required in America's war effort. Many materials you handle every day are scarce. Spare parts are hard to get. Your theatres may have to close unless equipment that you handle is cared for and conserved. It is vitally important to maintain your projection, sound, and stage equipment in good operating condition. Only in this way can your theatre be kept open to do its vital job of maintaining morale. Conserve, salvage, eliminate waste."

1. Keep projection rooms and equipment clean. Dirt causes wear and tear.
2. Lubricate all equipment properly, and exactly follow the manufacturer's instructions.
3. Make only necessary replacements to conserve spare parts.
4. Burn carbons at the minimum current specified by the manufacturer, and use carbon savers where available.
5. Clean lenses of optical systems with soft tissue and protect condensers and reflectors.
6. Service regularly all electric current distribution points, such as motors, generators, bus bars, fuses, switches, resistors, and condensers.
7. Allow sufficient warming-up periods for all vacuum tubes. Burn tubes at the specified ratings of the equipment manufacturers.
8. Inspect, thread, and rewind film very carefully and keep it clean.
9. Handle reels and film containers with care.
10. Do not throw anything away.

CARE OF SOUND EQUIPMENT

The maintenance and care a sound-reproducing equipment receives from the projectionist very ofter determines the longevity of the equipment. The entire motion-picture industry is striving to make the existing equipment and replacement parts last as long as possible.

Because the projectionist is responsible for the operation of the sound equipment, he is in a position to be of great help in the conservation of sound equipment parts and the prevention of unnecessary wear in any part of the equipment.

During normal conditions it has been considered good practice to replace certain mechanical and electrical parts of the equipment before they have been completely used up or worn out. In many cases the parts replaced would have given many more hours of service without reduction in quality of sound or impairing the mechanical operation of the equipment.

Because of the scarcity of all materials, conservation and the proper maintenance of equipment in the booth is not only a necessity but a duty which requires a conscientious effort on the part of each projectionist. The intelligent application of a coordinated effort will go a long way toward keeping the sound equipment in all theatres functioning.

Vacuum and P.E. Tubes

All vacuum tubes should be operated at their specified voltage rating as supplied by the tube manufacturer. While the design of vacuum tubes allows for some variation in voltage and current supplied to the tube, the most satisfac-

CHECKING THE DETAILS OF THE SOUND HEAD. The maintenance and care of a sound-reproducing equipment received from the projectionist very often determines the longevity of the equipment. But the checking starts, of course, with the installation. Here at a Rochester (New York) drive-in theatre, just prior to its opening, M. Harold Stevens (right), industrial sales manager of the Bausch and Lomb Optical Company, inspects the optical system of the Simplex Four Star soundhead, pointing for emphasis the details to Donald H. Peterson, salesman. All precision optical parts were manufactured by Bausch and Lomb. (B&L photograph.)

tory results are obtained from operation at the normal rated values.

Amplifiers using the large type power tubes, and if not equipped with a time-delay, pre-heating relay, require pre-heating of the filament element. This type of amplifier is usually provided with a filament-plate switch. The tubes should always be allowed to warm up 5 to 8 minutes before closing the plate current switch.

The tube contacts should be kept scrupulously clean. This will prevent poor contact which may result in intermittent noise or loss of sound.

A spare phototube should be stored in a cool place. Exceedingly high temperatures may cause the volatile cathode surface to evaporate and the cell to lose its sensitivity. The phototube anode voltage should be maintained within the manufacturer's specified limits. Operating phototubes with the anode voltage above normal may cause the tube to ionize, which will result in permanent damage to the tube. Avoid exposure to direct sunlight or projection arc, as this may decrease the phototube's sensitivity.

If the equipment uses mercury-vapor tubes, keep them in an upright position at all times after they have had their initial pre-heating. If possible, keep all spare tubes in their original packing cartons to prevent breakage.

If a tube has to be removed from some part of the equipment, do not discard it immediately. Let the service engineer make a thorough test to determine if the tube should be discarded or if it can be used in some other part of the equipment. Very often a certain tube can be usd in one place where it cannot be used in another.

Exciter Lamps

All spare exciter lamps should be stored in the spare parts cabinet. Exciter lamps should not be dropped as the filament may be damaged or bent out of position. Avoid too much tension on the lamp base, if used with a screw tightening exciter lamp holder, as it may crack the glass envelope. After the service engineer has determined the proper exciter lamp voltage setting, it should not be changed unless some emergency expedient requires this to be done. It is extremely important not to operate the lamps at a voltage higher than rated, as the useful life will be greatly decreased.

Soundheads

The mechanical parts comprising the soundhead are machined to very close tolerances, because of the delicate and precise function they must perform. Improper adjustment, lack of oil, improper lubrication and lack of proper maintenance all have a tendency to decrease the life of each moving part.

All moving mechanical parts and bearings should be properly adjusted and lubricated. Excess oil should be wiped off after each lubrication.

Optical Systems

All soundheads should be kept absolutely clean and free from oil. If necessary, small absorbent pads should be placed above the optical unit to soak up any excess oil. Most soundhead optical units are sent in for repairs because the lens barrel is partially filled with oil.

The soundheads should be wiped out periodically, using a cloth saturated with carbon tetrachloride or similar solvent. The lens elements may be cleaned with lens tissue and extreme care should be taken to avoid scratching the lens surface.

Projector Mechanisms

Projectors or soundheads should not be allowed to operate with excessive vibrations. When a machine vibrates excessively, it is a sure indication that some component part is not functioning properly. Unwanted projection room noise and poor screen results will be gradually increased if causes for vibrations are not located and corrected. Vibrations in one part of the assembled projector can lead to serious troubles in other parts, until the machine will eventually break down.

NOTES ON PROJECTOR CARE

Dirt has been the cause of serious film fires in preventing the proper operation of the automatic fire shutter or in clogging the fire-valve rollers. It makes them susceptible to wear and renders them useless for the purpose intended.

Dirt may also cause the stoppage of sound reproduction by accumulating on the various movable contacts or on the vacuum-tube contacts in the sound equipment.

It may cause losses in screen illumination, when deposited on the projection-arc reflector or condensers, and has resulted in the rapid deterioration of carbon contacts with communicated damage to the adjacent parts of the lamp mechanism.

Dirt on the gear teeth and shafts of the projector, combining with lubricating oil, acts like a grinding compound, causing excessive wear and shortening the effective life of the gears and bearings.

On fuse clips, dirt causes high-resistance contacts and the generation of heat which may sometimes cause the fuse to blow.

Make sure that the lamp house and all parts are kept thoroughly clean both inside and outside. The carbon ash, drippings, and so forth should be removed regularly once a day, especially from the shafts, bushings, and gears of the arc-control-operating parts.

The arc-exhaust dampers and ducts should be cleaned frequently of carbon ash, dust, and so forth. Any blockage, no matter how small, will affect the proper burning of the carbons, cause pitting of the mirrors, and produce a gradual accumulation of ash within the lamp house. If there is a filter in the air-supply system, make sure it is in efficient working order. Care should be taken to prevent dust and dirt from blowing into the projection room through any windows if left open.

Motor-Generators

To get the most out of motor-generators, they should be kept clean and all dirt should be removed before sparking becomes disastrous. Increased brush life, as well as increased commutator life, will be the direct result.

Dirt on commutators causes arcing and pitting, shortening their life, increasing maintenance costs. The contacting surface of each commutator brush should be examined periodically so that the commutator and bearing wear is held to a minimum.

If the generator is on a concrete floor, care should be taken in sweeping, so that abrasive dust from the concrete will not get into the bearings.

Projection Room

The exhibitor who is interested in keeping his projection maintenance costs low should extend to the projection room the same services used in cleaning the auditorium and other parts of the theatre.

The projection room floor, walls, and ceiling should be of such materials that will not dust off. If the floor is of exposed cement, it should be kept well painted with dust-proof or sealer paint, and should be mopped frequently.

A supply of lintless cloths for cleaning should be made available, as well as other cleaning facilities, such as carbon tetrachloride, brooms and dust pan, metal waste can, and the like. In fact, these should be standard equipment of the projection room.

A stiff-bristled toothbrush is useful for keeping the sprockets and idler roller clean. The space between the fire-valve rollers and the castings in which they are mounted can be easily cleaned by inserting a narrow strip of film and drawing it back and forth to dislodge any dirt.

Lubrication

Always follow the manufacturer's instructions and use only the grade of oil recommended by the manufacturer. The importance of lubrication of projection equipment cannot be over-emphasized. Projection equipment lubrication carried out properly and under the manufacturer's instructions will lead to trouble-free operation.

The use of the proper types of oils and greases and their proper application will give longer life to equipment and keep standards of projection on a high plane.

Rules for Lubrication

Strict adherence should be made to the following rules:

(1) Do not lubricate the mechanism while it is in motion. Doing so is hazardous to both the mechanism and to the projectionists.

(2) Do not over-lubricate. Excessive lubrication is costly and wasteful. It also impairs the quality of the sound and of the picture. Only small oil cans which dispense small quantities of oil at a time should be used.

(3) Cleanliness in conjunction with lubrication is an important matter, since excessive oil deposits promote the collection of dirt, dust, and grit on the vital parts of the projection equipment.

Should the fire rollers become coated with oil, they will collect dust and grit, which will scratch the emulsion on the film. Such marring and destruction of film is very costly, and definitely contributes to no good.

Deposits of oil, grease, and grit on the film strippers cause wearing of the sprocket and damage to sprocket holes.

Excessive oil on take-up devices causes them to slip, resulting in film mutilation by pile-up or sprocket breakage.

All containers of oil should be kept carefully covered, and oil cans should be cleaned before refilling.

Necessary Replacements

Due to the difficulty of obtaining replacement parts, it will be necessary to make present parts last longer. The projectionist must assume greater responsibility in his care of the apparatus he operates. This means daily inspection of the various items of the apparatus to insure to the utmost degree continuous, efficient operation. To a large extent this can be accomplished by systematic care to eliminate abnormal wear.

The projector has many precision-made parts. To reduce replacements and repairs to a minimum, the projectionist should keep his eyes constantly open for signs of uneven or jerky motion of the mechanism and his ears attuned to any unusual noises during operation. A good practice is to turn the projector over slowly by hand before the start of each day's show to see whether it revolves freely or not. If it seems to bind, the switch must not be thrown or serious damage may result. With the projector idle, try by hand the meshing of the teeth of the main drive gear, the lower sprocket pinion gear, and the intermediate gear. When the teeth on any or all these gears show signs of wear, they should be realigned.

At least once a week, check the synchronizing marks on the vertical shaft gear, the intermediate gear, and on the intermittent movement flywheel to see whether they are in the proper operating position.

Intermittent Movement

Watch the intermittent. Any slack that may develop between the star and the cam, or in the cam and flywheel shafts, should be removed and every visible screw tightened at least once a month. This will avoid much future trouble.

Care should be taken when removing the intermittent sprocket, movement or any other delicate part, not to strike the hard surface of the mechanism housing, as the good parts may be burred or jarred out of perfect alignment. When the intermittent sprocket or star-wheel shows undue wear, tension on the pad or film guide should be checked and the spring compressed or released until the desired tension on both sides of the shoe is obtaind. Too much tension wears the sprockets and may damage the film.

The Pad Rollers

The pad rollers should be adjusted by the simple method of placing two thicknesses of standard 35-mm. film on the sprocket held tightly over the teeth. The surface of the roller should be allowed barly to touch the film, and then the arm is tightened in this position.

The rollers should be in line with the sprocket teeth; that is, the teeth should operate in the recess formed in the rollers. A good practice is to wash the sprocket teeth at least twice a week with a stiff-haired brush dipped in kerosene, and at least once a week the entire mechanism should be thoroughly cleaned with kerosene to remove all injurious foreign bodies.

When Making Repairs

Always, when making repairs, or installing gears, make sure beforehand that the proper procedure is thoroughly understood and that guide marks are scribed by hand on the parts or that the factory guide marks match in order to have perfect alignment.

Proper tools should be available before starting on any such work.

On some mechanisms the stipper plates and sprockets may be reversed when they show undue wear, but such reversing should be done very carefully and after some thought, as in some cases more harm than good can be done.

Film Handling

Film should at all times be carefully handled. It should be kept away from all sources of heat, except the normal heat during projection. The regulations against smoking should be obeyed.

Film should under no circumstances be left lying exposed on benches or elsewhere, but should be immediately placed in metal containers or cabinet after use.

Film should be inspected each time before it goes through the machine. The only way that film can be properly inspected is by slowly winding the film by hand. Inspection should cover tears, splices, and defects in sprocket holes.

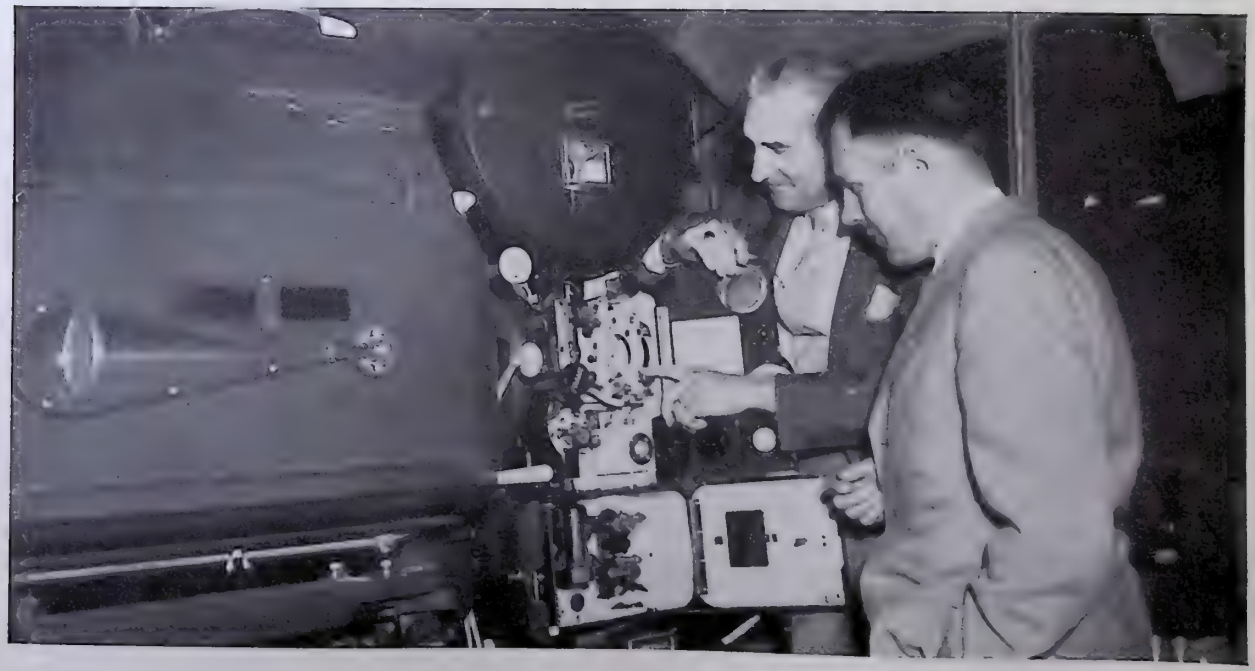
Do not use bent reels.

Use fresh film cement for making all splices.

Film should be carefully threaded through the machine. It should be in proper place on every roller, gate, and sprocket. Excess slack at the top and bottom of machines should be taken up before the machine is started.

Magazine doors should be closed as soon as the film is threaded and should be kept closed during the entire operation.

CHECKING THE DETAILS OF THE PROJECTOR MECHANISM. Here M. Harold Stevens points out to Donald H. Peterson, the position of the 3½-inch Super Cinephor projection lens. This six-element lens is coated with a metalic fluoride to increase light transmission. In projector maintenance, the elimination of all dirt is of paramount importance, for dirt may cause so many troubles that it is sheer folly to permit it to accumulate. Dirt may be contributory to film fires, a stoppage of sound, loss of screen brightness, excessive wear and tear on teeth of gears and on bearings. Remember, carbon ash is, also, a form of dirt. (B&L photograph.)



Upper and Lower Magazines

The following list should prove helpful in the care and maintenance of the upper and lower magazines.

Tighten all screws.

Check all bushings, shafts, and reel locks.

Watch the upper magazine tension. Excessive tension causes fast wearing of the upper feed sprocket.

Keep the upper friction springs and collars clean and lubricated. Avoid jerky upper magazine feed.

When adjusting the take-ups, place a heavily loaded reel in the lower magazine. Start the motor, and, beginning with no tension, gradually tighten until the reel picks up and revolves slowly from any position in which it is stopped. Give an extra half-turn to the adjusting knob, and lock it.

Do not wait for take-up belts to break. Change belts every 30 days, and allow oil-soaked leather belts to dry thoroughly. Carefully examine removed belts for breaks, bad spots, and the like.

Reels and Film Containers

A bracket or rack should be erected on which to keep all empty reels, instead of allowing them to lie on the floor or elsewhere where they may be damaged.

Film storage cabinets and shipping cases should be kept clean.

Bent reels should be saved, as manufacturers make arrangements to straighten such reels.

After putting reels into the film cabinet, the compartment door should be closed by hand. It should not be allowed to snap back into place by its own weight. Care should be taken that the ends of films do not stick out.

Miscellaneous Equipment

A few precautions in the care and maintenance of rewinders, reels, splicers, and electrical changeovers will prove helpful in prolonging the useful life of the equipment.

Rewinder alignment should be checked.

Aluminum reels should be handled with care, as, of course, should all other kinds.

Realign the splicer and check the cutting blades.

Once a month, check the change-overs and the foot switches for proper contact and alignment.

Projection Lamp Operation

It is suggested that motion-picture theatres operate projection lamps at or near the minimum arc current for the trim in use, if the resulting reduction in screen illumination below that at a maximum recommended current can be safely tolerated. The general adoption of this suggestion should result in a considerable power and carbon saving, and, for those theatres using copper-coated carbons, a substantial reduction in copper consumption.

It is felt that this suggested reduction in operating current, while bringing the level of screen illumination below recommended practice in many instances, will still permit acceptable projection of motion pictures and, in wartime, at least, was justified by the substantial saving of power and essential materials which were accomplished in this manner.

Check ammeters and voltmeters in projector-arc circuits to be certain they are accurate before making any alterations in present operations.

Also check into the availability of reliable carbon savers on the market that will operate satisfactorily in your lamps.

Be sure to use the most economical carbon combination and length of carbons available for your lamps.

Avoid striking an arc too soon.

Lenses, Condensers, Reflectors

Lenses, condensers, and reflectors should be cleaned with special lens paper or soft cloth. Avoid the use of abrasive cleaning materials or cloths containing fibers that scratch.

Condensers and reflectors should be cleaned only when thoroughly cool, as any sudden cool draft may damage the optical system.

Most arc lamps are equipped with inside protective flame shields. These shields should be properly maintained.

Projection optical systems should be cleaned every day before the show.

Do not turn the mirror around in its holder, as in a very short time the entire surface will be pitted. Do not attempt to remove pits forcibly.

Check the mirror-retaining clips for the proper holding tension. When too tight, the mirror may crack due to the expansion of the glass.

Port glasses should be cleaned daily.

Treated (coated) lenses should be cleaned in accordance with the manufacturer's instructions.

Keep oil from reaching the lens element.

Care should be taken to prevent chipping.

These instruction pertain to both sound and projection optical systems.

Soundhead Care

In the care and maintenance of the sound head, practically the same precautions should be followed as indicated for the upkeep of the projector mechanism.

The many electrical connections should be frequently checked and tightened.

When a rotary stabilizer is used, the roller should be left open at all times, except when film is running in the projector.

Warm-Ups for Vacuum Tubes

It is important that amplifier and rectifier tubes be pre-heated and become stabilized at operating temperatures before the sound system is operated. Usually a 15-minue period is sufficient for this purpose.

Certain types of tubes, particularly rectifiers, require a pre-heating period to allow the electron emission to become stabilized so that all parts of the filament are liberating electrons before the plate voltage is applied to the tube. If the plate voltage is applied before sufficient electrons have been emitted, the surface of the filament may be damaged, or part of the filament may be burned away at one spot.

Many of the larger tubes have spiral extension springs to take up the slack of the filament resulting from expansion and elongation due to the heating. Sufficient pre-heating time should be allowed to permit the filament to assume its normal operating position before applying the plate voltage.

Mercury-vapor tubes must be pre-heated to drive the mercury from the filament and plate elements before applying the anode voltage. This usually requires from 3 to 5 minutes, depending upon the location of the mercury in the tube and whether or not the tube has previously been pre-heated. Tubes of this type have an initial pre-heating period of 5 to 15 minutes and then used for 2 or 3 days. They can be stored in a vertical position for future use.

Once a mercury-vapor tube has had an initial pre-heating and all the mercury has been driven off the tube elements, the daily pre-heating period is much shorter than when the tube is first put into operation.

Equipment manufacturers issue instructions regarding pre-heating of tubes where necessary. Follow these instructions carefully.

Tube Operation

Tubes should be operated at the voltage ratings specified by the manufacturer. An accurate meter should be used in making these measurements. A majority of installations are provided with a 110- to 120-volt switch to adjust the primary input voltage. If the amplifier or unit is not equipped with a switch of this type, the voltage may be adjusted by moving the tap on the primary of the power transformer.

Operating the tubes on line voltages above the normal value will not add anything to the output of the tubes, but will only decrease their life.

Operating the tubes below their normal rated voltages also shortens tube life.

Rectifier Care

Ventilating fans in rectifiers require periodic inspection, and lubrication from one to two times a year.

The rectifier should be located in a well-ventilated cool spot, where a free flow of air can be maintained. Avoid placing rectifiers too close to other equ'pment, and do not place material on top of them.

In bulb-type rectifiers, the bulb sockets and clips should be inspected to make sure they are clean and not corroded or pitted. Sandpaper may be used to remove corrosion in order to make good contact. The bulbs should be secure in their sockets, and should be checked every few weeks. The various connections should also be checked.

The power input to the rectifier should correspond to the transformer rating. Voltages should be kept as close as possible to the recommended values. Variations over 10 per cent should be corrected.

Resistors, Ballast Rheostats

Resistors do not ordinarily wear out if they are properly selected for the duty they are to perform. These units need no spcial service, except to be kept clean and all connections to them be kept tight. It is suggested that not less than once every six months they be freed of all dirt and dust by the use of a blower. Resistors should be properly placed and frequently ventilated to prevent overheating.

All outside connections on ballast rheostats should be checked. The cover should be removed periodically, and the bolted connections to the resistor material checked.

Rectifiers should not be operated above the recommended rating.

Once a year, or oftener, if necessary, blow out the accumulated dirt and lint in the rectifier stacks. This will insure proper ventilating and cooling.

Electrical Distribution Points

Friction is the greatest cause of wear and tear on all rotating equipment. Anything that can be done to reduce friction will tend to increase the life of all such equipment. It is, therefore, impossible to place too much emphasis in cleanliness of the equipment, as well as of the surroundings of such equipment.

In order to prevent dust and dirt from dropping or being blown into the unit itself, all walls, as well as the floor and ceiling, of the motor-generator room should be cleaned regularly.

Lubrication of the unit should be done in accordance with the instructions of the manufacturer and a chart should be kept of such lubrication to show the regularity of such service.

Bearings should be drained at regular intervals of not more than six months and refilled with a good grade of oil of a viscosity as recommended by the manufacturer.

Brush contact should always be good and the tension should be kept at the minimum that will not allow sparking. Brushes should be staggered so as to allow even wear across the entire width of the commutator. Never use brushes other than the grade recommended by the manufacturer.

Keep all slots in under-cut commutators clean by the use of a wooden stick of the proper width. Never use oil on any commutator. If necessary to use an abrasive on the commutator, clean both brushes and commutator thoroughly afterward.

Keep shafts and couplings in proper alignment.

Blow out all dust and dirt from the windings of the unit with a blower.

Alignment of the motor and generator shafts should be checked and the couplings kept tight. Misalignment and looseness causes vibration, increased wear, and costly replacements.

Bus Bars, Fuses, Switches

Bus bars, fuses, and switches do not ordinarily wear out: they generally burn out, and do so because they are not kept clean. Dirt or corrosion causes resistance to electric current, and resistance causes heating; the heat causes additional resistance and a vicious circle is thus built up which eventually destroys the unit. Good contact, therefore, is the first requisite of extended life of these units, and good contact is maintained by cleanliness and tight connections.

Go over all switchboard connections regularly with proper tools, and if refillable-type fuses are used, make sure that all contacts within the fuse itself are clean and tight.

The numerous a.c. and d.c. switches throughout the projection room should be inspected at least once a month. The panels should be opened and every nut and bolt, switch, and fuse-holder should be cleaned and tightened.

Conservation Notes

Because of shortages of many materials, and the difficulty sometimes of obtaining immediate replacements for theatre equipment, all broken and worn-out parts should be saved.

Save all gears made of steel, bronze, brass, or other material. Sprockets, pad rollers, blades and jaws of old switches, copper wire, arc-lamp jaws, and other metal parts should be repaired or otherwise disposed of at some future date.

Do not throw away a transformer or motor of any kind. The copper can be reclaimed and the cores can be used again. There are some manufacturing concerns who will not ship a new transformer unless the old one is returned.

Broken aluminum reels and other aluminum parts should be welded or otherwise repaired. If the part cannot be mended, save the aluminum, anyway.

Reel and trailer cans should be returned to the film exchanges. Nearly every projection room has an accumulation of these cans which is taking up valuable space.

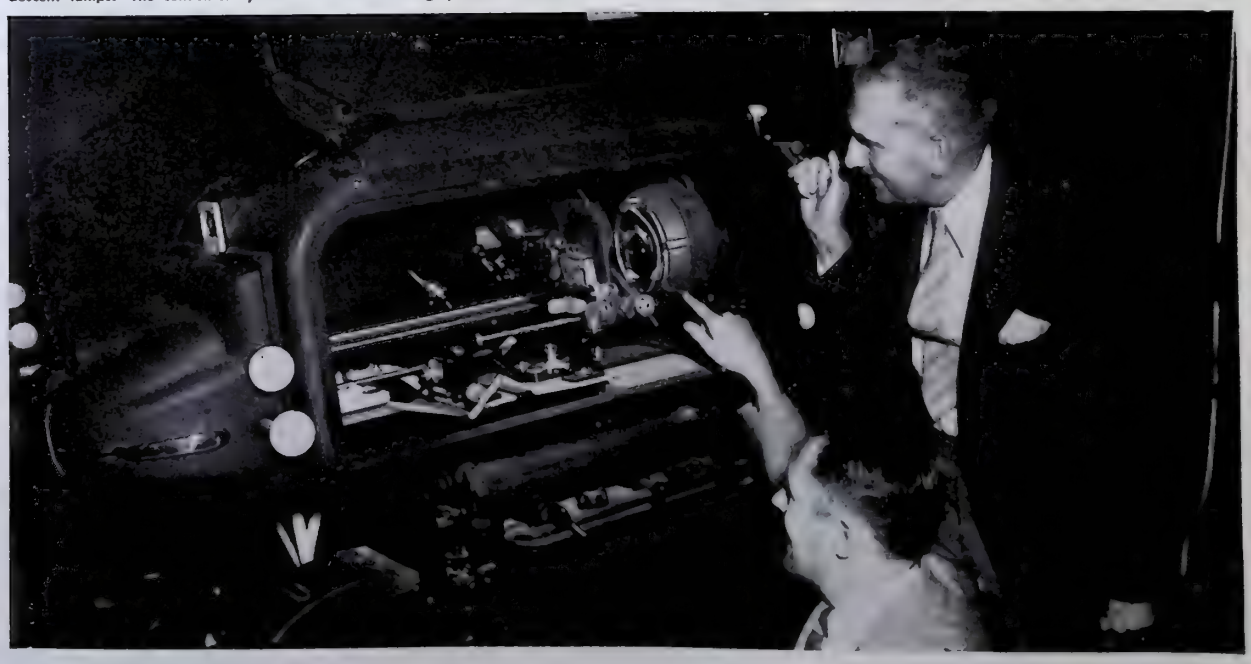
Trailers and sections of film not in use also should be returned to the exchanges, who will forward the film to film-reclaiming companies.

Remove and save the copper coating from old copper-covered carbon stubs. Save all copper drippings from copper-coated projector carbons. Provide a metal pail in which to store the copper drippings and the copper plating.

Do not throw out used or defective vacuum tubes of any kind. There are many valuable metals used in the manufacture of these tubes. Cooperate with sound engineers by conserving all tubes and other replacement parts.

Copper wire, rubber-covered cable, and cable plugs should be conserved. Fix up all cables and plugs in use at the present time. Save all pieces. Provide a box and some space in which to store all defective or burned-out electric-light bulbs.

CHECKING THE DETAILS OF THE LAMP HOUSE AND ARC. Here Donald H. Peterson draws the attention of M. Harold Stevens to the Bausch and Lomb condenser system installed in conjunction with the Simplex E-7 projectors' Peerless Hy-Candescent lamps. The condenser system consists of two high-precision condensers nested together. Projection lamps should be operated in accordance with the recommendations of the manufacturer, both as to the current characteristics and the carbon trim, to achieve the best results with the picture on the screen. All other equipment in booths should be given thorough periodic inspections. (B&L photo.)



Notes on Common Projection Room Hazards

Safety and Well-Being of Projectionists Regarded as Definite Occupation Dangers

THEODORE P. HOVER
Staff Writer, International Projectionist

Projection room fire is usually so spectacular and impressive to those involved in it, that it leaves a lasting impression. The result is that the beginner or apprentice has a definite ritual drummed into his consciousness, namely: cut off the light and turn off the motor; next to see that all port shutters have dropped or to grab a fire extinguisher, or, as frequently stated, to jump out of a window.

The only case within my knowledge of a projectionist attempting to carry out his boast that "When the fire starts, I'm on my way," occurred when the man in question was assigned to an unfamiliar theatre. A short-circuit in the distributing panel at one side of the projection room caused a blinding flash and explosion. The projectionist made for a window in the back wall of the room and was half through it when he discovered to his horror that he was about seventy feet above the pavement with no fire escape or ladder available. (P.S.: He didn't jump.)

Due to constant vigilance by projectionists, film fires and injuries resulting from them are slowly being reduced. However, assistance from both theatre-owners and fire officials has been limited: projectionists are largely on their own. Major attention to the fire hazard has resulted in glossing over other important occupational dangers, classified as: (1) Mechanical, (2) Electrical, (3) Personal health, and (4) Location and building.

MECHANICAL HAZARDS

Open gears, flywheels, and chains may easily come in contact with the hands or elbows of the projectionists, or more often, catch in their clothing. A short coat is emphatically much safer than the long smock which is frequently used. The idea that projectors are driven by a fractional horse-power motor and therefore constitute no particular hazard is a fallacy.

Heavy flywheels and the high inertia of the moving parts can remove a finger with the precision of a rotary saw, and the abominable practice of oiling projectors while they are in motion has added to the hazard. Neckties may catch in the moving parts, and care should be taken that handkerchiefs do not hang from the hip pocket and catch in gears or chains.

Some projectors have a very small clearance between sprockets and idler rollers when open. A finger carelessly placed on the moving film may be carried under the roller and badly mangled by the sprocket teeth. Sheet metal cones should be attached to the front of every lamphouse so that there will be absolutely no light leakage from cooling plate to lamphouse. It is a recognized fact that many of the older projectionists lost out due to eyestrain from this source.

Manufacturers have gone to considerable trouble to place grills and screens over the commutators and moving parts of motor generators, projector motors, exhaust fans, and arc feed motors; but it is safe to say that less than 10 percent of these guards are retained after the equipment is installed, usually being removed and lost. The practice of permitting ordinary electric fans to be placed in a projection room is exceedingly dangerous. The State of Ohio, for example, recommends that any such fan, regardless of positioning, should be covered on all sides with hardware cloth of a mesh small enough so that a handful of 5/8-inch ball bearings dropped on the guard will not fall through.

Careless or clumsy use of hand tools results in many serious injuries due largely to the fact that cuts and bruises become infected through lack of attention. One of the commonest accidents in projection rooms is caused by a screwdriver slipping and stabbing the projectionist. Almost as frequent are injuries caused by sharp slivers of steel being thrown from cold chisels or improperly used hammers. Snapping hacksaw blades can be extremely dangerous, as the parts may be thrown for a considerable distance. The only cure for this condition is a thorough knowledge of the proper use of hand tools.

ELECTRICAL HAZARDS

The assumption that it is "only 110 volts" and therefore not dangerous is a first-class joke, cases being on record of death being caused by coming into contact with 70 volts a.c. It is often assumed that the power packs used in conjunction with amplifiers are not dangerous because, while they may deliver 200 or 300 volts, the amperage is low. The fallacy of this is proved by the electrocution of a Lima, Ohio, police radio operator who came in contact with the plate circuit of a small pre-amplifier. He was killed instantly, although the power supply was less than 250 volts.

Safety switches placed on amplifiers should not be strapped out, and, if defective, they should be replaced. Particular attention should be given to discharging high-voltage condenser banks before attempting to service an amplifier. A good condenser will retain a charge overnight or longer.

PERSONAL HEALTH HAZARDS

The personal health of the projectionist, as a result of his own negligence, usually receives less attention than even the most neglected piece of projection equipment. There can be no excuse for Union officials permitting a member to work in a projection room which is improperly ventilated (an 89-cent fan set in an open window does not constitute proper ventilation). I have heard many complaints by sound engineers regarding the accumulation of carbon dust and precipitated material from arc lamphouses in sufficient quantity inside the amplifiers to cause noise and, in some cases, completely cut off the sound. Some projection rooms have an accumulation of lamphouse deposit hanging from the ceiling above the lamp rivalling the stalactite formations of the Grand Caverns.

It is useless to go into detail regarding sanitary facilities in projection rooms, because projectionists themselves have permitted these matters to be neglected over a long term of years and will probably continue to neglect them in the future. The fact remains, however, that proper action can usually be secured if the Union does something about it. Public officials now are more receptive than ever before to such requests.

The careless placing of conduit and flexible conductors where they can be tripped over can easily be avoided when equipment is installed. Floor coverings with snags or breaks are very dangerous and should be replaced or carefully cemented down. Grease or oil spots or carelessness in dropping carbon stubs can cause a bad spill which may result in broken bones. Bare concrete floors have been pointed out as a menace to the life of projector parts and film; however, the same dust is just as destructive to projectionists' lungs.

Some years ago it was customary to paint projection room floors with sodium silicate (water glass). This was fairly successful in giving a smooth finish to the floor and in preventing, for a considerable time, the dusting off of the cement surface. In damp weather, however, this material becomes a semi-conductor of electricity, and there are possibilities of a violent shock if all equipment is not carefully grounded.

Examining film by rewinding it with the edges held between the thumb and forefinger is particularly dangerous. The exchanges maintain, and correctly, that this tends to crack sprocket holes and damage the film; but the real danger is the sharp edges of the film which will cut into the flesh like a razor blade, the dirt or dust on the film offering an ex-

This discussion of projection-room hazards is reprinted from the January, 1946, issue of the International Projectionist, by special permission of R. A. Entracht, editor.

cellent means of infection. A bottle of iodine and a number of bandages should be readily available in every projection room. (Mercurochrome, widely used as a "substitute" for iodine, is nothing of the sort, not having as much strength.)

Chemicals in common use in the projection room deserve some attention. Consistent exposure of any part of the body to lubricating grease and oils often results in serious irritation and may induce skin cancer. Many projectionists, in order to save their good clothes, keep at hand a pair of dirty oily trousers which they put on when making extensive repairs to their equipment. These oil-soaked clothes frequently result in painful sores due to the fact that certain skins are allergic to petroleum products. It is an established fact that some 90 percent of the skin cancer epidemics which periodically break out in various industries are the direct result of the continued contact with dirty clothes saturated with oil or commercial solvents.

Many projectionists compound their own film cement, some of which is at once both wonderful and frightful. Frequently, glacial acetic acid is used. The fumes of this poison are violently irritating to the nasal passage and throat, and the projectionist who gets it on his fingers may carelessly rub his eyes, thereby occasioning a dangerous inflammation.

The most flagrant disregard of commonsense and safety is the use of gasoline or naphtha anywhere in a theatre. Few realize that the fumes of these solvents are heavier than air, will flow down ventilating shafts and settle close to the floor, remaining there for hours ready to explode at the slightest spark or open flame. This fact suggests an interesting experiment for you to try:

A piece of ordinary spouting or bent tin from 6 to 10 feet in length is laid from the edge of a table at an angle down to the floor. On the floor at the bottom of the trough place a lighted candle. At the top of the spouting place a warmed teaspoon into which has been dropped five drops of gasoline or naphtha. Use an eye dropper, not a gasoline can, as this demonstration is not a suggested means for suicide. In a few seconds the gasoline will have evaporated and suddenly a trail of flame will start at the candle and go up the entire length of the metal trough, showing that the gasoline fumes, being heavier than air, will travel downhill. Fire underwriters have records of entire homes being moved as far as 100 feet due to the use of gasoline as a cleaner for hardwood floors, the fumes traveling down through a hot air register and igniting at the furnace.

Many projectionists use carbon tetrachloride (Carbona) or other non-flammable solvents to wash projector parts. While this material is fire-proof, attention is directed to the fact that the commercial product has many impurities, and continued inhalation of the fumes therefrom can cause serious injury to the heart and lungs. Like any other solvent, they should be used only in a well ventilated room.

Another unwise practice is the storing of film cement in glass bottles, excepting possibly the small one or two-ounce bottles used with an applicator. There are several instances of these bottles being tightly corked and exploding due to the expansion of the solvent fumes of the cement. A tin can with a screw top is by far the safest item. If they should explode, they, at least, will not throw glass splinters around.

LOCATION HAZARDS

Another source of injury is rather rare, but when it occurs the results are always unpleasant, namely, the dropping of port shutters on the projectionist's fingers. Many fire officials and theatre inspectors impose silly rulings that, regardless how efficient be the fuse system used on these shutters, they must be supported by a sashcord or other combustible cord. This is a nitwit idea. The abnormal heat in the projection room quickly rots cotton or hemp fibres, which have a habit of parting and dropping a port cover just as the projectionist has his hand on the port. Broken or badly lacerated fingers are usually the result.

The practice of installing port shutters weighing as much as 50 pounds and not counter-balancing them is also to be condemned. Many such shutters are so heavy that if they were ever released by the fuse system, they would not only crash shut but their weight would tear the entire framework off the wall, and, possibly, the shutter might have to be retrieved from the basement. It is the writer's opinion that there is a separate section of hell screened off for the persons originally responsible for the construction of a projection room door approximately 18 inches wide and 5 feet high. Such doors are an abomination.

The projectionist will find it necessary occasionally to go back stage to check horns or other associated equipment. Extreme care should be taken in working in what may be unfamiliar territory. Modern speaker assemblies weigh from 500 to 4,000 pounds, and are easily overbalanced or tipped. The policy favored by a number of local unions of requiring that each member work one week in each theatre of the city in order to familiarize himself with the projection room and its equipment is to be highly recommended, for this practice permits familiarity with many diverse equipment set-ups.

A suitable container for carbon stubs possible, the proper place for it, despite the rulings of certain inspectors, is within the lamphouse itself; it should be is an absolute necssity, but, wherever emptied at least once each day, either before or after the day's run. Carrying the hot carbon stub outside the lamp to a container constitutes an unnecessary hazard.

Almost every projection room has a certain number of constructional hazards, such as poorly lighted stairways or refuse or material piled near the top of the steps, thereby providing a means for instant transportation to the bottom, usually resulting in broken bones. The writer tried this means of exit and cannot recommend it.

Large windows in the projection room, unprotected by bars or a fire escape, are a definite hazard, as it is entirely possible for a projectionist to be blinded by smoke or flame and fall through one of these open windows—but good!

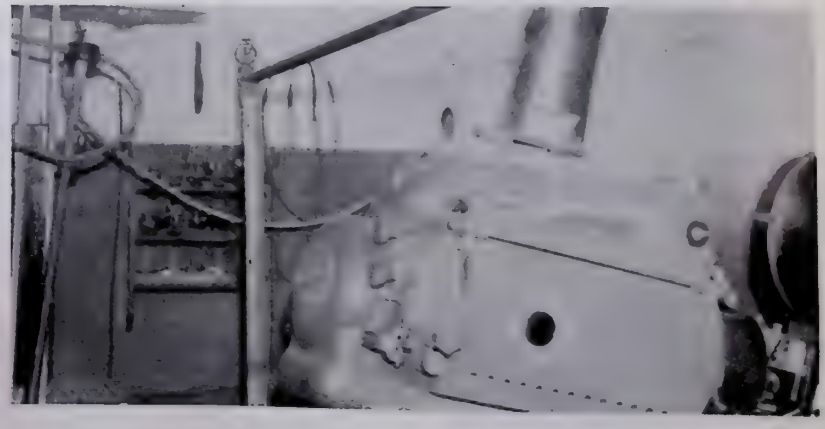
Accidents do not "just happen." They are caused by doing something the wrong way. Only continued vigilance, thought, and study will reduce the rather high accident rate of the theatrical profession.

Many projectionists rely on accident insurance policies instead of on accident prevention programs, boasting that they have so much insurance that they are worth more dead than alive. Only that projectionist who has sufficient accident and life insurance the income from which will equal his present and future salary possibilities has the right to make this statement; and few of us have that right.

CONCLUSION

As a concluding thought, and for the benefit of both projectionist and theatre owners, experience qualifies me to make this remark: no projectionist can handle his equipment in a safe and satisfactory manner if his mind is occupied with the problem of how he is going to pay last week's bills with next week's salary; and the same holds true for the employe who may be wondering whether he is going to be compelled to go on strike in order to get his salary next Saturday night. Preoccupation with matters outside the theatre means a projectionist and an audience in danger within the theatre.

ONE PROJECTION BOOTH where the miracle is that accidents are not the rule is this one. Here are seen overhead wires, and a sprinkler system line propped up from the floor—with but five feet clearance under the horizontal pipe. Under such working conditions as this, it is small wonder that projectionists are apt to consider the job just merely a job. Here there is no reason why this sprinkler system cannot be properly relocated.



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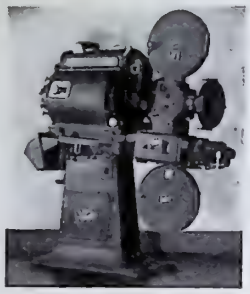

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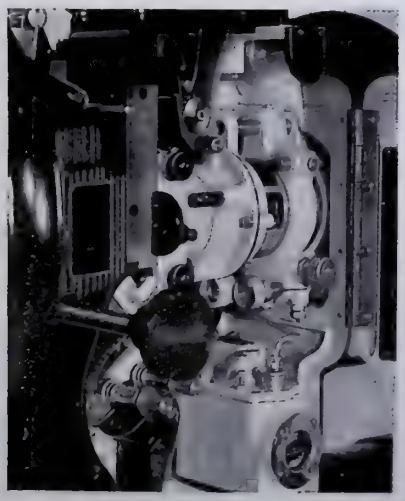

INTERIOR OF SIMPLEX E-7 MECHANISM

SOME OF THE SPECIAL ADVANTAGES OF THE Simplex E-7 MECHANISM

SYNCHRONIZED FRONT AND REAR SHUTTERS—Shutters are on the same shaft and each shutter acts upon one-half of the beam, creating a dissolving effect and giving 12½% more light. **More light, sharper picture, LESS EYE STRAIN.**

AUTOMATIC FIRE SHUTTER SAFETY TRIP—Releases fire shutter when film remains stationary. Cuts off light and heat. **Absolute Fire Safety.**

ONE-SHOT OILING SYSTEM—By a slight pressure on the oil pump lever, filtered oil is supplied in sufficient quantity at all times. **Cleaner Picture, Better Show, Longer Life, Less Maintenance.**

E-75 AIR DEFLECTOR AND APERTURE COOLING UNIT—Improves Light. Reduces Heat at the Aperture. Keeps Mechanism Cleaner. Prevents drawing of gasses from the arc lamp into the projection room.

REMOVABLE FILM GATE—Readily Demountable for Cleaning and Adjustment.

FILM GATE STUDS—Gate wobble eliminated. **Help Steady the Image. Proof Against Wear.**

CONE-SHAPED PAD SPRINGS—Pad keeps both edges of film under equal tension. **Reduces Sprocket Wear.**

TENSION PAD AND INTERMITTENT SHOE COMBINATION—Holds Film Securely for Steady Image.

DEMOUNTABLE FILM TRAP—Particles of emulsion can be easily cleaned away between reels. **Avoids Scratching Film.**

STUDIO TYPE GUIDES—Side motion of film controlled by replaceable guides acting in conjunction with guide rollers. **Prevent Side Sway of Film.**

THREADING FACILITIES—Quicker, more accurate threading. **Gives Projectionist More Time to Watch His Screen and Attend to Maintenance.**

FRAMING LAMP—Directly behind aperture. **Reduces Mis-framing.**

ILLUMINATED, WHITE INTERIOR—Dirt can be easily seen and promptly removed. **Promotes Cleanliness.**

SIGHT BOX—Easily removable, New fin construction. **Dissipates Heat.**

REAR SHUTTER COOLING FINS—Draw the air backward from aperture and pass it around outside the mechanism. **Insure Much Cooler Film Path.**

REAR SHUTTER GUARD—Can be quickly removed without disturbing lamphouse. **Simplifies Cleaning.**

RING TYPE GOVERNOR FOR FIRE SHUTTER—Unique type of control operates on principle of a gyroscope. **Bind-Proof, Silent.**

OVERSIZE DRIVE GEARS—Revolve on fixed studs. Place pressure of operation where it causes least wear. Rebushing of main frame eliminated. **Longer Life, Easier Maintenance.**

SYNCHRONIZING DEVICE—Prevents backlash and travel ghost caused by wear in shutter assemblies. **Gives Sharper Picture.**

DOUBLE BEARING ARM AND COVER—Warp-Proof Under Any Lamp.

INTERMITTENT MOVEMENT—Readily removable. Unnecessary to take down or disturb any part of the soundhead. **Facilitates Maintenance.**

INTERMITTENT MOVEMENT OIL SYSTEM—Reservoir can be filled from either side. Excess oil overflows on drive side. **Prevents Blurred Pictures, Noisy Sound.**

SHOCK PROOF GEAR—Eliminates vibration caused by the action of the intermittent movement. **Results in Quieter, Smoother Operation.**

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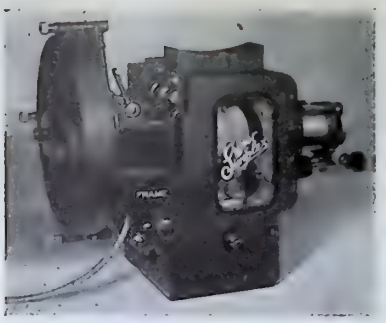

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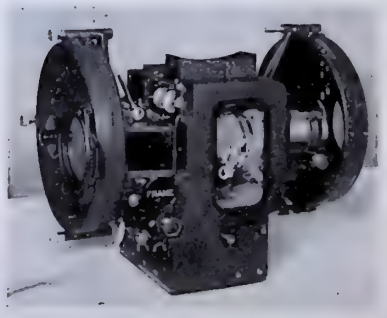
Super Simplex PROJECTOR

SUPER SIMPLEX has proved itself in thousands of large and small theatres in the United States and throughout the world because it is sturdy and steady, dependable, efficient and economical. It has all the basic mechanical excellence due to design and construction which has given Simplex equipment a world wide leadership for many years, plus many special patented features. Super Simplex Projector is an assurance of priceless Simplex dependability, superior projection, ease of operation and low maintenance cost. Theatre owners desiring to give their patrons better projection will be glad to know that the synchronized front and rear shutters which are an integral part of E-7 Simplex Projector, can be supplied as an attachment for the Super Simplex Mechanism.



SUPER SIMPLEX
MECHANISM
with FRONT SHUTTER
ATTACHMENT

SOME OF THE SPECIAL ADVANTAGES OF THE Super Simplex MECHANISM

SUPER SIMPLEX REAR SHUTTER—Built as an integral part of the Super Simplex Mechanism. Reduces the heat at the aperture from 50% to 75% as compared with the old type Front Shutter.

ADJUSTABLE REVOLVING SHUTTER—Permits adjustment to compensate for wear in the gear train.

PATENTED FILM TRAP LOCKING DEVICE—Prevents film trap door being opened by film patches.

MAIN FRAME CASTING—Improved design and sturdier construction.

INTERMITTENT MOVEMENT—Patented star and cam adjusting feature.

LATERAL FILM GUIDE ROLLERS—Of large diameter. Revolve very easily. Eliminate possibility of cutting film by roller remaining stationary.

LENS HOLDER—Has front and rear lens supports and is rigidly attached to the main frame.

REMOVABLE FILM TRAP DOOR AND PRESSURE PAD ASSEMBLY—Very convenient for cleaning and repairing—eliminates "chatter."

HARDENED AND GROUND VERTICAL SHAFT—More than doubles wearing quality. Greatly reduces possibility of bindups.

HARDENED AND GROUND SYNCHRONIZING GEAR SHAFT—Reduces wear and increases smoothness of operation.

BAKELITE MICARTA GEARS—Give longer wear and quieter operation.

MAIN DRIVE GEAR FASTENING SCREW LOCKING DEVICE—Prevents loosening of main drive attaching screw.

MICROMETER FOCUSING DEVICE ON LENS MOUNT—Prevents backlash and maintains perfect focus.

MAIN DRIVE SHAFT—Hardened and ground, and tubular construction, provides reservoir for oil, insuring adequate lubrication at all times.

SLIP-IN TYPE APERTURE PLATE—For standard and special effects.

STAR WHEEL—This and other parts are hardened and then ground, which gives longer wear and permits finer tolerances than machining soft product and then hardening.

CAM AND CAM PIN—Quality of material, hardness, workmanship and exact tolerances make this far superior to any similar product. Insures quietness and smoothness of operation.

INTERMITTENT SPROCKET—Rims and Radii of teeth hardened, and ground to almost zero tolerance by specially designed precision machinery.

DYNAMICALLY BALANCED FLYWHEEL—Reduces vibration.

INTERMEDIATE GEAR SHAFT—Super Simplex hardened and ground intermediate gear shaft gives twice the wear of soft shafts.

SPECIALLY DESIGNED REAR SHUTTER BRACKET—Very sturdy and greatly reduces the possibility of vibration—an integral part of mechanism, not an attachment.

SYNCHRONIZED FRONT AND REAR SHUTTERS—Shutters are on the same shaft, and each shutter acts upon one-half the beam, creating a dissolving effect and considerably increasing illumination. **Better Light, Sharper Picture, Less Eye Strain.**

SUPER SIMPLEX PEDESTAL—Designed for modern heavy duty equipment, but so flexible little effort is required to raise or lower, or horizontally adjust the entire apparatus. Can be accommodated almost instantaneously to the screen position. Stand easily leveled at all four corners. Excellent rigidity secured by means of leveling bolts.

Manufactured by INTERNATIONAL PROJECTOR CORPORATION, 92 GOLD STREET, NEW YORK CITY

Distributed by

A UNIT OF NATIONAL STANDARD PROJECTION SYSTEM

NATIONAL
THEATRE SUPPLY
Division of National • Simplex • Bladworth, Inc.

Simplex ★★★★ Sound SYSTEMS

THE HIGH STANDARDS we have created and maintained during the past 30 years enable users of Simplex ★★★★ Sound to give their patrons the finest possible entertainment at a moderate cost.

Simplex ★★★★ Sound in design and construction meets all the requirements of theatre owners for thoroughly modern equipment. It is so flexible it can readily accommodate dual track stereophonic recordings, push-pull and any of the proposed forms of the controlled track or other changes when approved by the motion picture industry. The quality of all Simplex Systems is the same, and patrons of small theatres as well as large, can derive all the enjoyment which is the result of true sound reproduction.

The SPECIFICATIONS shown herewith will permit theatre owners to meet their budgets and theatre requirements by installing the correct number of amplifiers to provide the proper output and equip with the number and types of loudspeakers to supply capacity and distribution.

SPECIFICATIONS

Simplex ★★★★ SOUND SYSTEMS

TYPE E

Simplex Four-Star Rotary Stabilizer Sound Heads
10 Watt Undistorted Output
Monitor Amplifier and Monitor Loud Speaker
2-Way Permanent Magnet Speaker System with:
- One (1) High and
- One (1) Low Frequency Speaker Unit
- One (1) 1 x 3 Exponential High Frequency Horn
- One (1) Low Frequency Folded exponential Horn

TYPE A-15

Simplex Four-Star Rotary Stabilizer Sound Heads
D.C. Excitation
15 Watt Undistorted Output
Monitor Amplifier and Monitor Loud Speaker
2-Way Permanent Magnet Speaker System with:
- One (1) High and one (1) Low Frequency Speaker Unit
- One (1) Multi-cellular exponential High Frequency Horn
- One (1) Folded exponential Low Frequency Horn

TYPE A-30

Simplex Four-Star Rotary Stabilizer Sound Heads
D. C. Excitation
30 Watt Undistorted Output
Monitor Amplifier and Monitor Loud Speaker
Dual Emergency Volume Control Amplifiers
2-Way Permanent Magnet Speaker System with:
- One (1) High and one (1) Low Frequency Speaker Unit
- One (1) Multi-cellular exponential High Frequency Horn
- One (1) Folded exponential Low Frequency Horn

TYPE B-30

Simplex Four-Star Rotary Stabilizer Sound Heads
D.C. Excitation
30 Watt Undistorted Output
Monitor Amplifier and Monitor Loud Speaker
Dual Emergency Volume Control Amplifiers
2-Way Permanent Magnet Speaker System with:
- Two (2) High Frequency and two (2) Low Frequency Permanent Magnet Speakers
- One (1) Multi-cellular exponential High Frequency Horn with double throat
- Two (2) Folded exponential Low Frequency Horns

TYPE B-60

Simplex Four-Star Rotary Stabilizer Sound Heads
D. C. Excitation
60 Watt Undistorted Output
Monitor Amplifier and Monitor Loud Speaker
Dual Emergency Volume Control Amplifiers
2-Way Permanent Magnet Speaker System with:
- Two (2) High Frequency and two (2) Low Frequency Permanent Magnet Speakers
- One (1) Multi-cellular exponential High Frequency Horn with double throat
- Two (2) Folded exponential Low Frequency Horns

TYPE C-60

Simplex Four-Star Rotary Stabilizer Sound Heads
D. C. Excitation
60 Watt Undistorted Output
Monitor Amplifier and Monitor Loud Speaker
Dual Emergency Volume Control Amplifiers
- Two (2) High Frequency and four (4) Low Frequency Energized Speakers
- One (1) Multi-cellular exponential High Frequency Horn with double throat
- Two (2) Folded exponential Low Frequency Horns

Distributed by

NATIONAL THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.

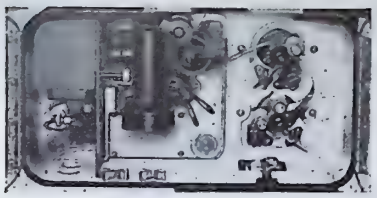
All Simplex 4-Star Sound Systems are available with Voice of the Theatre Speaker Systems.

A UNIT OF NATIONAL STANDARD PROJECTION SYSTEM

FEATURES

Simplex ★★★★ SOUND SYSTEMS

SOUND HEAD MECHANISM



FILM MOTION past the scanning light beam is controlled by the well-known Rotary Stabilizer Principle.

PREFOCUSED EXCITER LAMP of new design for 9 volts, 4 amperes. Has a short sturdily supported filament minimizing vibration. Manufacturing tolerance on exciter lamp filament height is plus or minus .0012 inches. The exciter lamp bracket is easily removable and designed to permit vertical and lateral adjustments for exact positioning of filament. The exciter lamp compartment is well ventilated and careful shielding prevents any stray light from entering film compartment.

HIGHLY EFFICIENT OIL PROOF OPTICAL SYSTEM designed for protection against soiling.

PHOTO-ELECTRIC CELL vertical mounting eliminates microphonic noise. Completely out of way when threading film. Easily accessible for cleaning or replacement, less susceptible to static disturbances from film, gears, or take-up belt and well shielded against stray light. Impossible for oil to reach and saturate connecting wires and socket which are well protected and shielded in photo-cell arm casting.

LATERAL FILM GUIDE AND PRESSURE ROLLER equipped with trigger control for easy operation.

DRIVE MOTOR, cradle suspended, over-size, one-quarter horsepower split-phase induction motor with ball bearing mounted rotor, insures constant speed with variation of less than 0.5% with voltages from 105 to 125 volts. Flywheel of proper design insures correct starting speed.

FILM DRIVE SPROCKETS, sound and holdback, included. All shafts of drive mechanism rotate on dust-proof ball bearings.

DRIVE MECHANISM ONE ASSEMBLY easily removable as a single unit by removing four screws.

SIGHT OIL GAUGE gives immediate and positive visual indication of oil level in reservoir. Insures proper lubrication of sound mechanism if oil level is maintained.

SOUND-HEAD design insures accurate alignment of projector drive gears and easy installation or removal of projector mechanism.

VOLUME CONTROL AMPLIFIER

CABINET is neat and compact. Permits mounting on front wall of projection room to avoid vibration. May be partially recessed in wall for concealment of wiring.

VOLUME CONTROL for system is a special design, de-tented step-by-step potentiometer having 19-2db. steps.

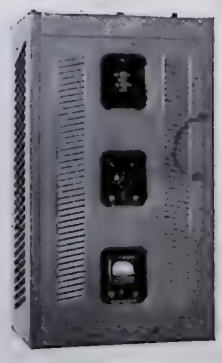
TWO-STAGE RESISTANCE COUPLED VOLTAGE AMPLIFIER employing 6J7 tubes has a 46db. gain. Normal operation at 26db. Metal type 6J7 selected for inherent shielding, uniformity and freedom of microphonic tendencies.

ELECTRONIC SOUND CHANGE-OVER comprises a three-way switching arrangement, one at each projector station, to control bias of second stage of volume control amplifier. This method of change-over control is instantaneous and noiseless since it avoids the necessity of breaking the signal circuit. Switching may be made at either projector. The exciter lamp circuit is simultaneously transferred in the change-over operation.

DUAL AMPLIFIER UNITS with single shaft, operating both volume controls in unison, can be accommodated. This provides for emergency operation or dual track reproduction.

CO-AXIAL CABLE of special low capacity couples photo-electric cell output to volume control amplifier. Low capacity shielded cable connects volume control amplifier to power amplifier.

MAIN AMPLIFIER EQUIPMENT



POWER TRANSFORMER mounted on each amplifier chassis is oversize to render continuous service on 50 or 60 cycles and tapped to compensate for various line voltages of 105, 115, and 125 volts.

AMPLIFIER FREQUENCY CHARACTERISTICS. Warping adjustments permit variations in the low frequency and high frequency response characteristics, to match various loudspeaker characteristics and equalize for theatre acoustic conditions.

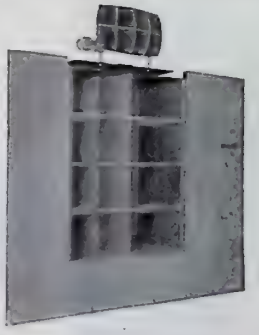
PHOTO-ELECTRIC CELL BALANCER equalizes the signal input to the power amplifier.

LOUDSPEAKER NETWORK with 400 cycle cross-over couples amplifier output to the two-way loudspeaker system. Special design features, careful selection of capacitors, resistors, and other parts afford stability of operation under all conditions.

LOUDSPEAKER NETWORK CONTROL PANEL incorporates switches for speaker testing and emergency operation on low frequency speakers only.

AMPLIFIER SWITCHING FACILITIES are provided which permit isolation of an inoperative amplifier from the signal circuit without disconnecting from power supply.

LOUDSPEAKER EQUIPMENT



COMPACT, STURDY CONSTRUCTION throughout minimizes space, simplifies installation, and reduces maintenance cost. All parts on special mountings easily removable to facilitate servicing.

HIGH FREQUENCY LOUDSPEAKER. Genuine multi-cellular exponential horn.

LOW FREQUENCY LOUDSPEAKER. Folded exponential horns of wood construction throughout. Driving units of high power handling capacity and efficiency.

MONITOR LOUDSPEAKER. Design is a definite step toward extension of the frequency response over that generally found in monitor speakers.

MONITOR AMPLIFIER provides adequate power to drive the monitor loudspeaker.

EXCITER LAMP OPERATION ON ALTERNATING CURRENT is possible in the event of failure in the rectifier system regularly supplying direct current.

Manufactured by INTERNATIONAL PROJECTOR CORPORATION, 92 GOLD STREET, NEW YORK CITY

All Simplex 4-Star Sound Systems are available with Voice of the Theatre Speaker Systems.

Distributed by

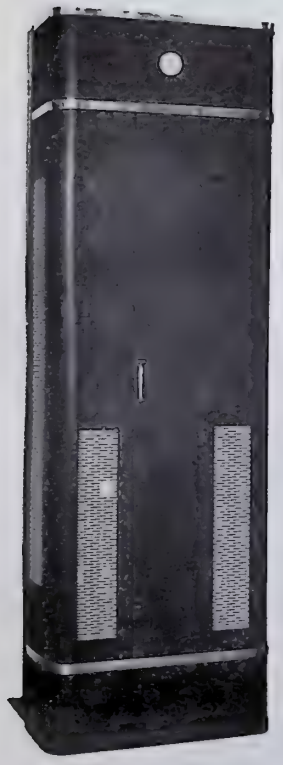
A UNIT OF NATIONAL STANDARD THEATRE EQUIPMENT

NATIONAL THEATRE SUPPLY
Division of National's Simplex • Bladwerth, Inc.

RCA THEATRE EQUIPMENT

Everything for the Theatre!

RCA SOUND EQUIPMENT
FOR EVERY SIZE AND TYPE OF THEATRE



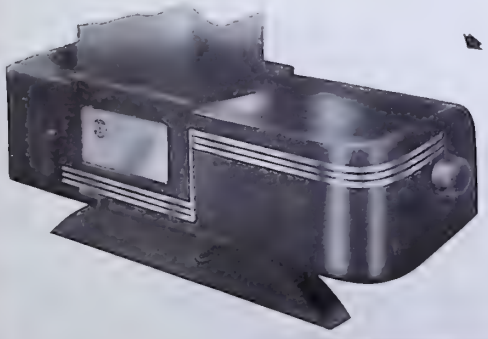
Over 8000 progressive theatre owners in all parts of the world have turned to RCA for their theatre equipment. For RCA's continual forward-looking research and vast engineering facilities have resulted in an outstanding line of equipment, with an unusual record of performance. Be sure you see RCA before you buy any theatre sound equipment.

RCA AMPLIFIER AND POWER SUPPLY RACKS

RCA's vast experience in the building of top quality amplifiers and power supplies for recording studios and broadcast stations gives it a tremendous advantage in designing theatre amplifiers. Here, for instance, is the famous PG-241 rack with slip on cover in place. This reliable, carefully engineered amplifier is guaranteed to deliver not less than 25 watts undistorted output over a frequency range of 50 to 5,000 cycles under Academy method of rating. Other amplifiers for every size theatre.

RCA DE LUXE ROTARY STABILIZER SOUNDHEAD

Here is the outstanding soundhead in the industry —extra safe, extra efficient, easy to install, easy to operate, and easy to keep clean and bright. RCA's famous Rotary Stabilizer with hermetically sealed case passes film smoothly and steadily past the light beam. Easy to thread. No stationary surfaces to scratch film. In addition, the exclusive RCA "Shock Proof" drive system isolates jerky loads of the intermittent movement and film take up. The result—smoother film motion, less "flutter" distortion. A complete line of RCA Soundheads available.



RCA DE LUXE TWO-WAY LOUDSPEAKER SYSTEMS

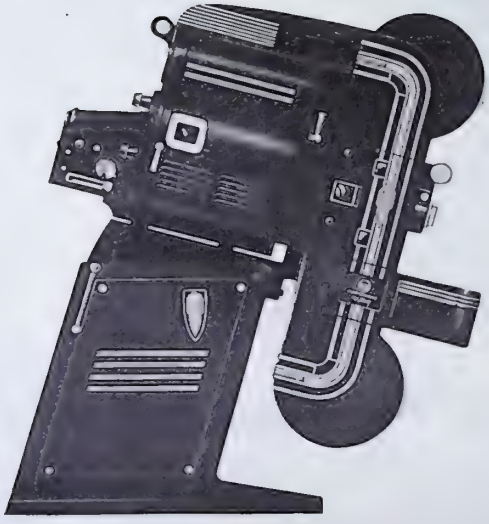
Here's a loudspeaker system any theatre owner would be proud to have. Two large directional baffles equipped with four efficient heavy-duty (30 watt) mechanisms and a three-sided extension baffle make up the massive low-frequency loud speaker assembly supplied with these systems. Both the high and the low frequency speaker units are made of the improved, and highly efficient alnico permanent-magnet material; *no power supply units are required for the speaker fields.* High sensitivity, enormous power handling capacity, and perfectly matched for balanced sound reproduction, are some of the important features. A genuine cellular horn, highly efficient coupling transformers, "regular-emergency" switch on cross-over panel, add to its performance. A complete line of RCA loudspeaker systems is available.

FOR FURTHER INFORMATION SEE YOUR RCA THEATRE SUPPLY DEALER

RCA THEATRE EQUIPMENT

Everything for the Theatre!

BRENKERT PROJECTORS—Unmatched Efficiency—Greater Reliability—Lower Operation Costs!



Brenkert "80" Projector with Brenkert Heavy Duty Base, Brenkert Enarc Projection Lamp with Controlled Ventilation, Brenkert Steel Magazines with Streamlined Covers, and RCA De Luxe Soundhead.

BRENKERT HEAVY DUTY BASE . . . Appearance and rigidity in keeping with de luxe projection standards. Complete with arc lamp switch, but not including soundhead mounting bracket. Order as Brenkert Catalogue Number BX-10-A base with 100 ampere switch and as BX-10-B base with 200 ampere switch.

BRENKERT MEDIUM DUTY BASE (Not Illustrated). A moderately priced base of modern design and features, complete with 100 ampere arc lamp switch but not including soundhead mounting bracket. Order as Brenkert Catalogue Number BX-14.

BRENKERT PICTURE CHANGEOVER SYSTEM . . . Attached to any Brenkert mechanism without machining. Efficient and noiseless in operation. Order as Catalogue Number BX-30 mechanism and BX-20 footswitch.

BRENKERT MAGAZINES . . . 18-inch steel magazines of sturdy design. Order as Catalogue Number BX-21 upper magazine, complete with spindle, and as BX-22 lower magazine complete with takeup pulley, spindle and clutch.

BRENKERT STREAMLINE COVER PLATES . . . Complete the streamlined appearance of projection unit. Order as Catalogue Number BX-26 for upper magazine and as BX-27 for lower magazine.

Exclusive forward-looking design features, rugged construction, highest quality parts, and precision manufacturing make Brenkert the outstanding projection equipment.

BRENKERT "80" PROJECTOR

A superb projection mechanism in every respect. Costs less in the long run because its long-life construction makes for exceptionally low repair costs. Here are a few of its outstanding technical features:

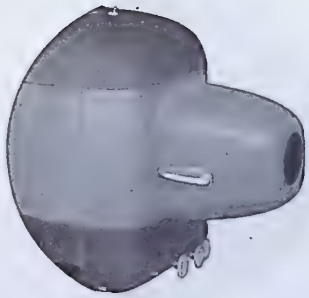
1. **Double Rear Shutters**
   - Up to 20% higher picture brilliancy
   - Clearer, more uniform picture definition
   - Minimum flicker
   - Minimum heat on film—maximum safety
2. **Rugged Enclosed Drive System Running in Bath of Filtered Oil**
   - Added reliability—no bindups
   - Long life all running parts
   - Quieter operation
3. **Special Aperture Cooling Fan**
   - Keeps aperture temperature at lower, safer level
   - Cannot cause draft through arc lamp, therefore eliminates all need for glass draft-shields
4. **Heavy Duty Precision Intermittent**
   - Long life with continual rock-steady projection
5. **Sturdy Film Trap Construction with Precision Film Stabilizing Features**
   - Makes for maximum picture steadiness for all film conditions
   - Quickly removable construction makes it easy to inspect and clean

Order as Brenkert Catalogue Number BX-80 Projection Mechanism with Dual Rear Shutters.

FOR FURTHER INFORMATION SEE YOUR RCA THEATRE SUPPLY DEALER

RCA THEATRE EQUIPMENT

Everything for the Theatre!



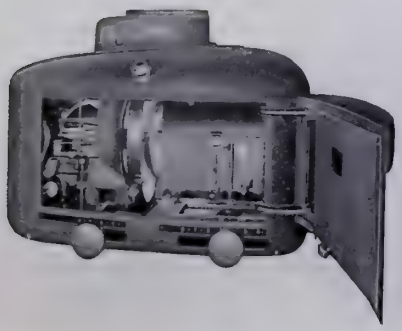
For easier and more accurate adjustment, complete reflector control is obtainable at the screen end of the lamp, close to projectionist's viewing port.

NEW BRENKERT RADARC PROJECTION LAMP

Only High Intensity Arc Lamp Specifically Designed for 1-kw Operation

Another Brenkert first! Brenkert engineers have developed the only high intensity projection arc lamp on the market specifically designed and engineered from top-to-bottom for 1-kw operation. The most significant postwar projection lamp for the medium sized theatre.

Now theatres using screens up to 18 feet wide can profit from the same high intensity projection excellence at nominal cost which were formerly used only by the modern-equipped first-run theatres because of the high initial and high operating cost. The new Brenkert Radarc lamp brings to exhibitors another opportunity for greater box office profits.



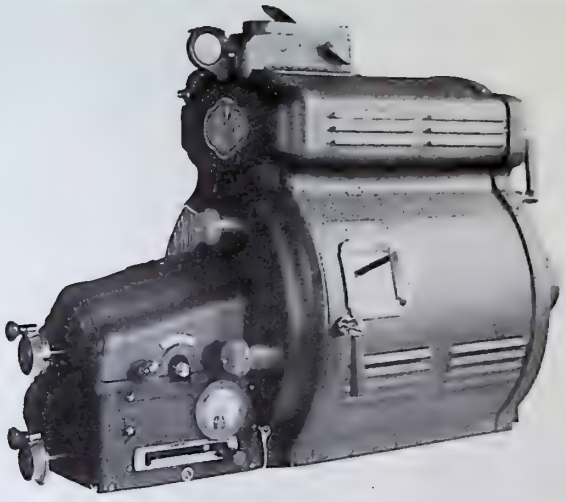
The low operating cost of the Brenkert Radarc—more snow-white light on the screen per power dollar spent, plus longer life carbons—puts this new high intensity lamp within easy financial reach of the medium sized theatre.

The Brenkert Radarc produces automatic high intensity light—uniform snow-white light—absolutely essential for the brilliant projection of Technicolor as well as black-and-white pictures in their true photographic tones. Brenkert design and Brenkert construction means true high intensity projection, high efficiency, high quality, top performance, low cost operation, trouble-free service, and smart streamlined styling. For bigger and better box office returns, install the new Brenkert Radarc.

FOR FURTHER INFORMATION SEE YOUR RCA THEATRE SUPPLY DEALER

RCA THEATRE EQUIPMENT

Everything for the Theatre!



BRENKERT ENARC LAMPS

. . . FLOOD YOUR SCREEN WITH MORE SNOW-WHITE LIGHT
. . . FILL YOUR THEATRE WITH MORE SATISFIED PATRONS

You'll find RCA Brenkert Enarc Lamps installed in the world's finest theatres. They give that final touch to motion picture projection that increases audience appreciation and insures continuous box office response.

Exhibitors get consistently uniform brilliant snow-white light in abundance for the best projection of Technicolor pictures in true color shadings . . . light of proper color to embellish photographic tones that make black and white pictures pleasing to the eyes of patrons.

Projectionists appreciate the unit assembly features of the RCA Brenkert Enarc that permit quick removal and replacement of assembled units for easy cleaning and service . . . the convenient back of the lamp-house installation of all moving and controlling mechanisms, away from heat and carbon dust . . . operating controls readily accessible from the rear of the machine . . . the simplicity of operation.

Theatre owners appreciate the trouble-free continuous service year in and year out . . . the long-run operating economy of more light on the screen for the same amount of power input . . . reduced maintenance and operating expenses.

Give your theatre a quality show with an RCA Brenkert Enarc—the projection lamp that never fails the box office.

OTHER IMPORTANT FEATURES

- Guides for accurate positioning of carbons
- Wide-range feed regulation
- Positive controlled ventilation
- Negative carbon adjustments made *behind* the reflector, with no chance of scratching it.
- Arc image screen in view from all parts of projection room

FOR FURTHER INFORMATION SEE YOUR RCA THEATRE SUPPLY DEALER

NOW in Production! SENSATION OF THE INDUSTRY!

DeVRY LOW-DISTORTION AMPLIFIERS . . .

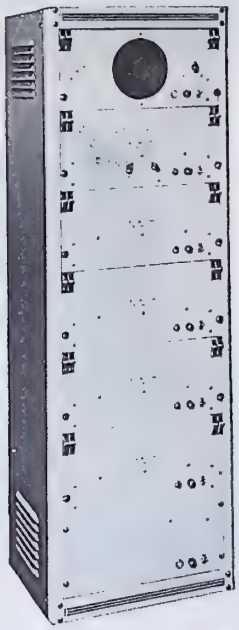
Are perfectly matched with DeVry built-in sound heads and speaker systems. They incorporate all latest proven developments essential to highest quality, true-to-life reproduction. All materials selected for DeVry amplifiers are the finest quality obtainable for long, trouble-free performance. All electrical components are readily accessible for quick servicing. Amplifiers are built on the individual-unit service plan.

NEW DeVRY IN-CAR SPEAKER *FOR DRIVE-IN THEATERS*

Compact, lightweight, precision-built to withstand long and rugged all-season service—the new DeVry *In-Car Speaker* designed for permanent installation on the parking ramp. Outstanding advantages include: (1) superb sound reproduction; (2) *In-Car* operation so that windows can be kept closed in inclement weather, permitting earlier theater openings and later closings; (3) individual volume control to patrons' taste; (4) sound confinement to theater area, eliminating community annoyance; (5) sound that reaches farthest park patron in same synchronization to image as those close-in. *Specifications and prices on request.*

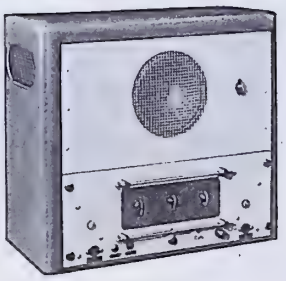
DeVRY "BRILLANTE" *PROJECTION LENSES AVAILABLE NOW!*

SERIES I or SERIES II—all high vacuum HARD, low reflectance COATED for increased light transmission, picture contrast and definition . . . all focal lengths.



(*Left*) "12000 SERIES," 80 Watt Amplifier—built on the easy unit-service and replacement basis—utilizing four 20 watt power amplifiers—wired to enable projectionist to use 20—40—60 or the full 80 watts as needed. Built-in, self-powered monitor speaker, electronic equalizer panel, separate wide range high and low frequency response controls.

(*Above*) "12000 SERIES," 40 Watt Amplifier—a dual channel unit utilizing two 20 watt power amplifiers which can be used in conjunction to deliver 40 watts, or independently to deliver 20 watts from either channel.



(*Left*) "12000 SERIES," 25 Watt Wall-Type Amplifier—includes built-in monitor speaker with independent volume control, equalizer for balancing outputs for dual projection. Microphone and turntable inputs, separate wide range high and low frequency response controls.

STAGE SPEAKER SYSTEMS

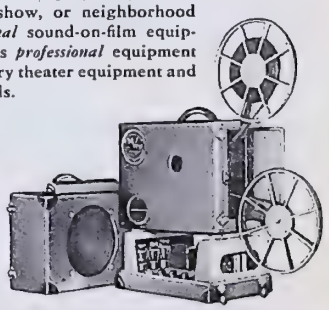
DeVry can supply a speaker system for theaters of every type and size—designed for new listening pleasure for the patron.

Preferred Equipment for Lucrative Professional 16mm. Operations

When it comes to auxiliary booth equipment for projecting locally filmed 16mm. news reels—or for road show, or neighborhood theater facilities, DeVry 16mm. *professional* sound-on-film equipment is preferred; primarily because it is *professional* equipment built by the same craftsmen who build DeVry theater equipment and to this equipment's same exacting standards.

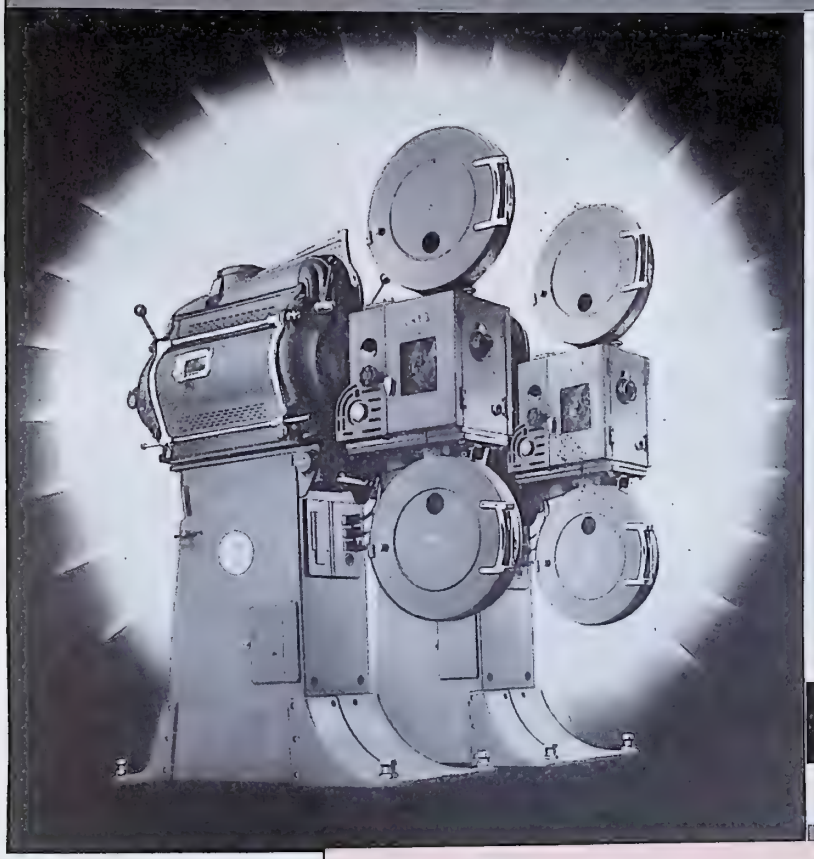
THREE-PURPOSE 16mm. EQUIPMENT

(1) SAFELY project *both* sound and silent films. (2) Show both black-and-white and color films without extra equipment. (3) Enjoy portable public address facilities indoors or out through separately housed 30-watt amplifier and sturdy 12-inch permanent-magnet speaker.



For the Perfect Show . .

The new DeVRY "12000 Series" THEATRE PROJECTORS AND AMPLIFIERS



SEE IT! HEAR IT!

Ask the DeVry Theater Supply Dealer nearest you for a "12000 SERIES" demonstration.

ALABAMA—ARKANSAS—
Tri-State Theater Service, Memphis 3, Tenn.
CALIFORNIA—
Projection Equipment & Maintenance Co., Los Angeles 7
Riddle's Theater Supply, San Diego
C. R. Skinner Mfg. Co., San Francisco 2
DeVry Corporation, Hollywood 25
FLORIDA—
United Theatre Supply Corp., Tampa
GEORGIA—
Theater Service and Supply Co., Albany
ILLINOIS—
DeVry Corporation, Chicago 14
KENTUCKY—
Hadden Equipment Co., Louisville 2
LOUISIANA—
Mr. Alon Boyd, Shreveport 72
MINNESOTA—
Norm Maintenance, Minneapolis 4
MISSISSIPPI—
Tri-State Theater Service, Memphis 3, Tenn.
MISSOURI—
Stebbins Theatre Equipment Co., Kansas City 8
Cine Supply Co., St. Louis 3
NEBRASKA—
Quality Theatre Supply Co., Omaha 2
NEW YORK—
DeVry Corporation, New York 17
NORTH CAROLINA—
Theatre Equipment Co., Charlotte 2
NORTH DAKOTA—
McCarthy Theatre Supply Co., Fargo
OHIO—
The Dayton Film, Inc., Dayton 6
OREGON—
Theater Utilities Service Company, Portland 9
SOUTH CAROLINA—
Theatre Equipment Co., Charlotte 2, North Carolina
TENNESSEE—
Tri-State Theatre Service, Memphis 3
TEXAS—
Associated Industries, Dallas 1
VIRGINIA—
Perdue Cinema Service, Roanoke 11
WEST VIRGINIA—
D. E. Lovett, Clarksburg
WASHINGTON, D. C.—
Elmer H. Briest & Son
WISCONSIN—
Gallagher Film Service, Green Bay—Milwaukee
CANADA—
Arrow Films, Ltd., Toronto
Empire Agencies, Vancouver, British Columbia
MEXICO—
Casa Ehlers, Mexico City

THEATRE SUPPLY DeVry Chicago EQUIPMENT DEALER

For the address of the authorized DeVry Theater Supply dealer nearest you, look for this symbol in the Dealer Section—or write DeVry at Chicago.

You Get More

Build your own *"yardstick"* to meas
audience satisfaction. Lay this *yardst*
and performance record of DeVry's

(1) STAMINA: First on the Exh
yardstick is STAMINA—those *"stand*
built into DeVRY's from their rugg
their chrome-plated film magazines.

(2) DEPENDABILITY: The new
built by craftsmen whose handiwork
war could hand out—against a back
precision equipment for the world's

(3) SIMPLICITY & SERVICEABI
DeVry achieved the high goal of all
intricate parts without impairing per
farther to incorporate *"unit servicing*
or amplifier unit may be quickly a
auxiliary unit, when necessary.

DeVRY CORPORATION

1111 Armitage Ave.
Chicago 14, Illinois, U. S. A.

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BALCONY: ☐ YES ☐ NO

- ☐ DeVRY Catalog of 35mm. Theater Projectors and Sound Systems
- ☐ DeVRY Catalog of 16mm. Sound-on-Film Projectors and related Audio-Visual Equipment
- ☐ DRIVE-IN Theater Equipment, including "In-Car" Speakers
- ☐ DeVRY Theater Projection Lenses
- ☐ Information regarding Road Show Organization and Operations

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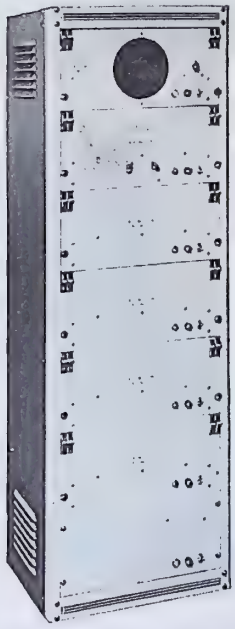
. Indoors or Out Your Best Buy is a DEVRY

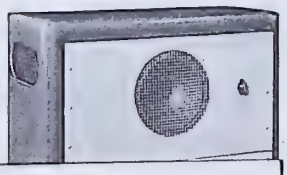
NOW in Production! SENSATION OF THE INDUSTRY!

DeVRY LOW-DISTORTION AMPLIFIERS . . .

Are perfectly matched with DeVry built-in sound heads and speaker systems. They incorporate all latest proven developments essential to highest quality, true-to-life reproduction. All materials selected for DeVry amplifiers are the finest quality obtainable for long, trouble-free performance. All electrical components are readily accessible for quick servicing. Amplifiers are built on the individual-unit service plan.



(*Left*) "12000 SERIES," 80 Watt Amplifier—built on the easy unit-service and replacement basis—utilizing four 20 watt power amplifiers—wired to enable projectionist to use 20—40—60 or the full 80 watts as needed. Built-in, self-powered monitor speaker, electronic equalizer panel, separate wide range high and low frequency response controls.



(*Above*) "12000 SERIES," 40 Watt Amplifier—a dual channel unit utilizing two 20 watt power amplifiers which can be used in conjunction to deliver 40 watts, or independently to deliver 20 watts from either channel.

(*Left*) "12000 SERIES," 25 Watt Wall-Type Amplifier—includes built-in monitor speaker with independent volume control, equalizer for balancing outputs for dual projection. Microphone and turntable inputs, separate wide range high and low frequency response controls.

STAGE SPEAKER SYSTEMS

DeVry can supply a speaker system for theaters of every type and size—designed for new listening pleasure for the patron.

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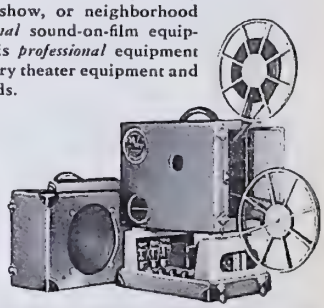

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DeVRY

MOTION PICTURE CAMERAS AND PROJECTORS

5-TIME WINNER DeVRY ALONE has Earned FIVE Consecutive Army-Navy "E's" for Excellence in the Production of Motion Picture Sound Equipment.

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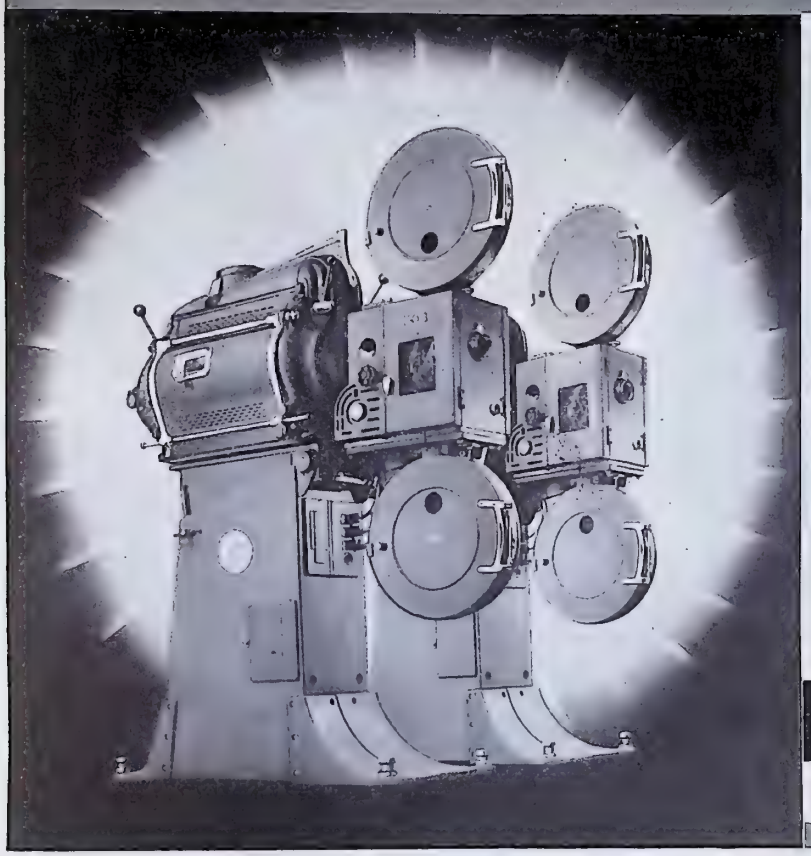
For the Perfect Show . .

The new DeVRY "12000 Series" THEATRE PROJECTORS AND AMPLIFIERS



SEE IT! HEAR IT!

Ask the DeVry Theater Supply Dealer nearest you for a "12000 SERIES" demonstration.

ALABAMA—ARKANSAS—
Tri-State Theater Service, Memphis 3, Tenn.
CALIFORNIA—
Projection Equipment & Maintenance Co., Los Angeles 7
Riddle's Theater Supply, San Diego
C. R. Skinner Mfg. Co., San Francisco 2
DeVry Corporation, Hollywood 25
FLORIDA—
United Theatre Supply Corp., Tampa
GEORGIA—
Theater Service and Supply Co., Albany
ILLINOIS—
DeVry Corporation, Chicago 14
KENTUCKY—
Hadden Equipment Co., Louisville 2
LOUISIANA—
Mr. Alon Boyd, Shreveport 72
MINNESOTA—
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Cine Supply Co., St. Louis 3
NEBRASKA—
Quality Theatre Supply Co., Omaha 2
NEW YORK—
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NORTH CAROLINA—
Theatre Equipment Co., Charlotte 2
NORTH DAKOTA—
McCarthy Theatre Supply Co., Fargo
OHIO—
The Dayton Film, Inc., Dayton 6
OREGON—
Theater Utilities Service Company, Portland 9
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TEXAS—
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THEATRE SUPPLY DeVry Chicago EQUIPMENT DEALER

For the address of the authorized DeVry Theater Supply dealer nearest you, look for this symbol in the Dealer Section—or write DeVry at Chicago.

You Get More of What You Want in the New DeVRY "12000"

Build your own *"yardstick"* to measure what it takes to achieve audience satisfaction. Lay this *yardstick* against the specifications and performance record of DeVry's new "12000 SERIES".

(1) STAMINA: First on the Exhibitor's projector-purchase *yardstick* is STAMINA—those *"stand-up"* characteristics that are built into DeVRY's from their rugged, streamlined pedestals to their chrome-plated film magazines.

(2) DEPENDABILITY: The new DeVRY is engineered and built by craftsmen whose handiwork took the toughest a Global war could hand out—against a background of years of building precision equipment for the world's finer theaters.

(3) SIMPLICITY & SERVICEABILITY: Designers of the new DeVry achieved the high goal of all design by eliminating many intricate parts without impairing performance. They went a step farther to incorporate *"unit servicing"*, whereby projector head or amplifier unit may be quickly and *easily* replaced with an auxiliary unit, when necessary.

(4) PERFORMANCE: Goal of the Exhibitor and his Projectionist is the *perfect show*—which DeVry achieves through the incorporation of both picture mechanism and sound head in one complete, compact unit, assuring projection and amplification that *exceeds* generally accepted professional and scientific standards.

(5) LOW MAINTENANCE COSTS: DeVry's "12000 Series" equipment is built for quick, easy, low cost maintenance, due to the simplicity and *accessibility* of all moving parts.

(6) PRICE: Moderate cost of "12000 Series" equipment makes it possible for any Exhibitor to enjoy the many advantages of *new* as against rebuilt units . . . enables neighborhood and small town Exhibitors to buy the same deluxe projection and sound facilities preferred by the world's larger and finer theaters.

Now—more than ever—the Exhibitor has a new and better pair to draw to for a full house—*new "12000 SERIES" DeVry Theater Projectors and Amplifiers—now in production.* See them in action and judge for yourself.

Indoors or Out Your Best Buy is a DeVRY

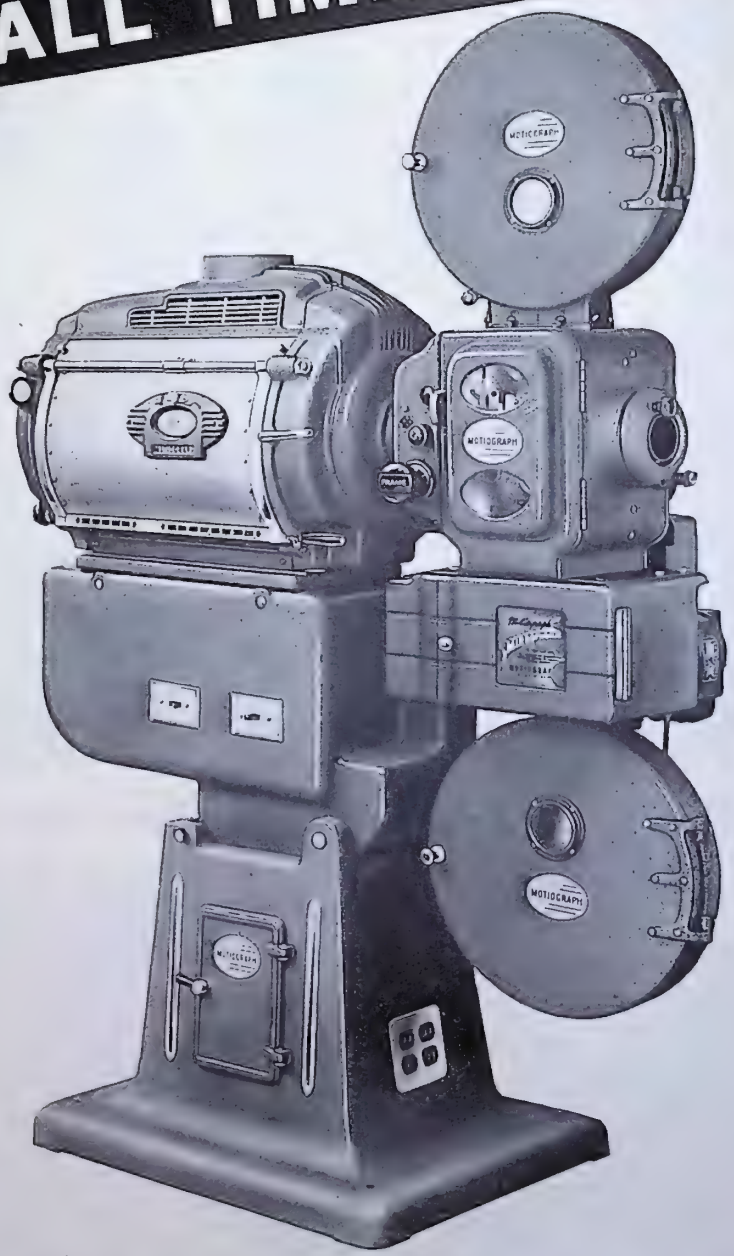
THE FINEST PROJECTOR OF ALL TIMES

THE COMPLETELY NEW

MOTIOGRAPH

"AA"

—by America's oldest manufacturer of great projectors. It sets a new standard in screen performance, the design and construction assuring long life with minimum upkeep.



Model "AA" Projector Mechanism on Model "AA" Pedestal, with Motiograph Arc Lamp, Model "K" Magazines and SH-7500 Reproducer.

For literature and complete information write

MOTIOGRAPH

4431 W. Lake Street • Chicago 24, Illinois

MOTIOGRAPH-MIRROPHONIC SOUND SYSTEMS

High Quality Sound Reproduction for Every Theatre

Utilize the SH-7500 sound reproducer, built by Motiograph and based on designs of Electrical Research Products Division of Western Electric Company.

Identical amplification equipment is furnished in all models, varying only in the amount of power furnished.

Choice of desired model of either Altec-Lansing "Voice of the Theatre" or Motiograph loudspeaker equipment.

Designed for quick easy servicing in the field.

Motiograph offers two basic sound systems—Models M-9-B and M-911 Dual, for theatres of 1,000 and 2,000 seats. The power output of these basic systems may be brought up to serve theatres up to 6,000 seats by the addition of one or more power amplifiers. Model M-9-B is available with five different sized loudspeaker systems and Model M-911 Dual with three different sized loudspeaker systems, while there is choice of three large loudspeaker systems in the higher powered sound system models.

Main amplifiers are all power-rated at two per cent distortion. First quality sound reproducers and D.C. excitation are offered in every model. In all dual models two or more main amplifiers are furnished, so that in an emergency sufficient amplifier power is available. Switching panels are furnished to afford facilities for operating either amplifier alone.

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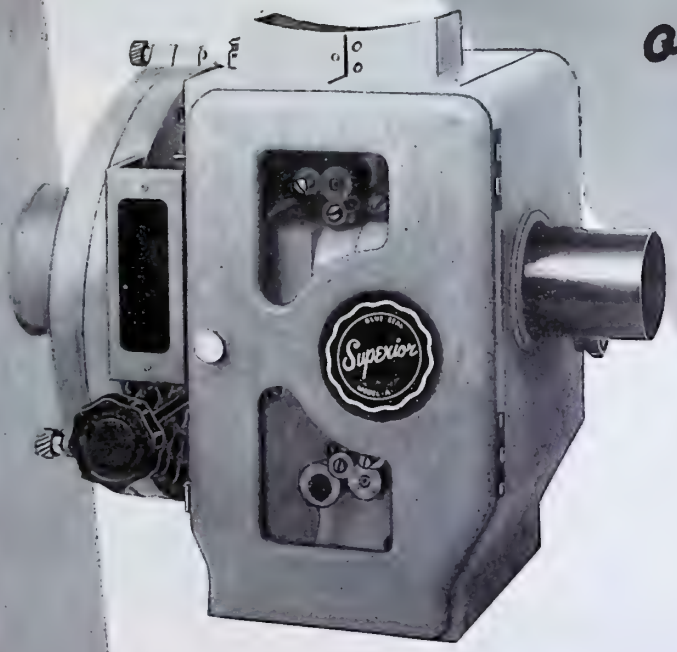
FOCUS YOUR ATTENTION

on the NEW



BLUE SEAL
Superior
MODEL-A

DOUBLE BEARING INTERMITTENT. Easily removable from frame. Oil filled case. Lubricated from operating side.

NEW REAR SHUTTER ASSEMBLY. Long single bearing. Alignment tools not necessary. Shutter drives directly from cam shaft. Eliminates back lash caused by driving through train of gears.

LARGE SIZE LENSE MOUNT. Designed for the new hi-speed F.2 lenses. Micrometer focusing.

STEEL AND PHENOLIC GEARS. Simple design requires fewer gears. Driving gears revolve on fixed hardened and ground studs.

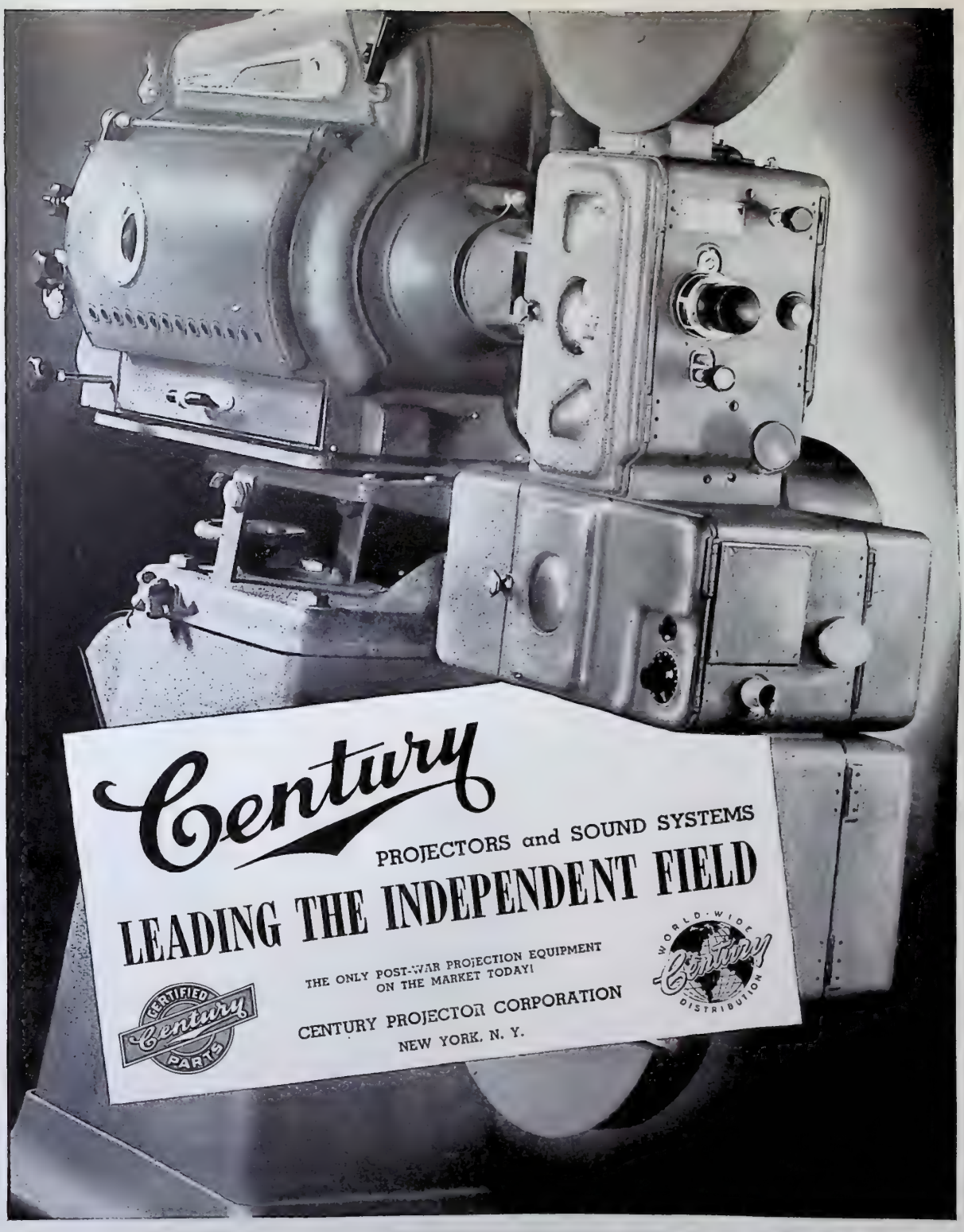
REMOVABLE FILM GATE. Opens wide for threading and cleaning. Hardened and ground long wearing film tracks.

ROOMY INTERIOR. Easy to maintain. Fewer long wearing, trouble free parts. Enjoying a good reputation since 1922.

Manufactured By

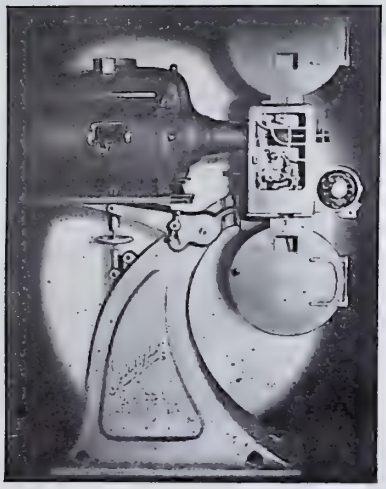
BLUE SEAL CINÉ DEVICES, INC.

137-74 NORTHERN BLVD., FLUSHING, L. I., N. Y. *Cable Address:* "SOUNDFILM"



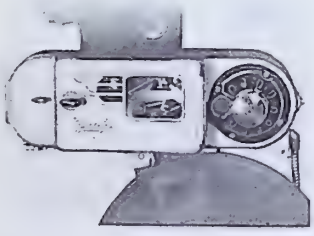
CENTURY MANUFACTURES A COMPLETE LINE OF REPLACEMENT PARTS FOR THE CENTURY MODEL "K" PROJECTOR MECHANISMS. INCLUDED ARE INTERMITTENT MOVEMENTS, HARDENED AND GROUND SPROCKETS AND STARWHEELS, PRECISION GEARS AND SHAFTS — ALL EQUIPMENT WHICH HAS BEEN PROVEN BEST BY ACTUAL TEST. **CENTURY CERTIFIED PARTS ARE SOLD THROUGH ALL THEATRE SUPPLY DEALERS — USED BY RECOGNIZED REPAIRMEN THE WORLD OVER.**

Syncrofilm EQUIPMENT BUILDS PROFITS 2 WAYS

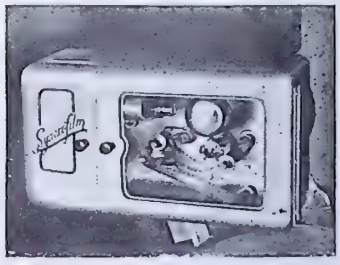


Operators of Syncrofilm-equipped theatres profit 2 ways: One, through Syncrofilm's audience-building performance in projection and sound reproduction and two, through Syncrofilm's low-cost upkeep and day-in day-out trouble free operation. Your theatre can be a greater profit producer equipped with Syncrofilm. 20 years in the making of precision projection and sound systems has established Weber Machine Corporation as the oldest independent manufacturer in the field.

Syncro-Dynamic Theatre Sound Projector combines modern projection and sound in one efficient, compact unit. Details of its "10 Points of Perfection", of its exclusive Dynamic Filter, of its new type cylindrical lens system are quickly available on request. All intermittent parts and sprockets are standard for easy replacement, mechanism adaptable to any standard projection base.



Syncrofilm "400" Sound Head readily adapted to any standard projector, reproduces sound of a quality heretofore unknown. Among other exclusive engineering features is Dynamic Filter proven by oscillograph tests to be superior to any other method of film control. Send for complete literature.



Syncrofilm Model E Sound Head is winning increasing applause as the finest sound reproducing system available in the low price field. Easily and quickly adapted to Simplex or Powers with no projector alterations. Complete specifications show that Model E quality is achieved through simplicity of design—not through engineering "short cuts".

WRITE FOR COMPLETE DATA ON SYNCROFILM PRODUCTS

Syncro-Dynamic Theatre Sound Projector
Syncrofilm "400" Sound Heads
Syncrofilm Theatre Speakers
Syncrofilm 20 Theatre Amplifier
Syncrofilm G Heavy Duty Theatre Amplifier
Syncrofilm Model HA Portable 35mm Projectors

Available Through Independent Supply Dealers

Syncrofilm Model E Theatre Speaker is engineered for properly balanced proportions of high and low frequency sound reproductions of highest quality for every seat in your auditorium. Utilizing a multi-cellular horn for frequency ranges above 800 cps. and a base reflex cabinet, it presents to your audience sound at its greatest perfection.

Syncrofilm "20" Theatre Amplifier for coverage of theatres up to 1,500 seats. Because it embodies all the latest developments in field of electronics, it assures natural sound reproduction. Here again, Weber engineering achieved practicality of design for economy of operation with minimum servicing. Write for all the facts of this popular model.

Licensed Under Western Electric Patents

WEBER Machine Corp.

ROCHESTER, N. Y.

Export Office: 13 E. 40th St., N.Y.C. 16
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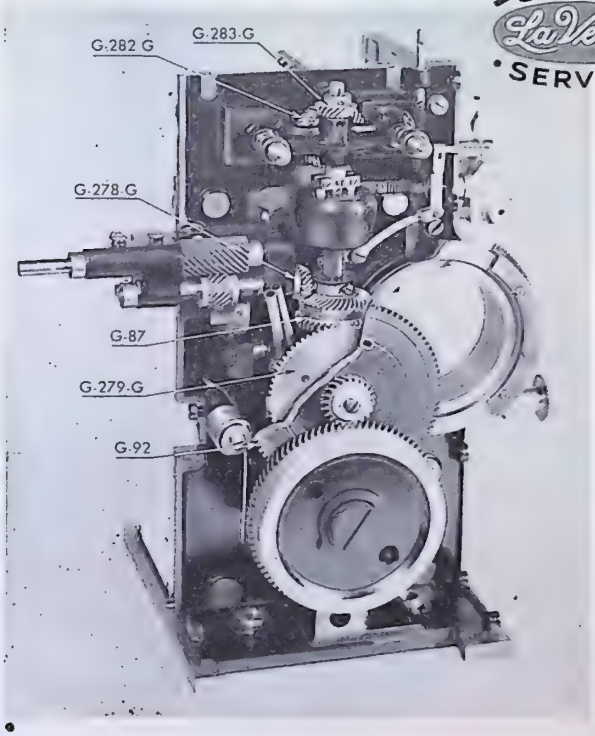
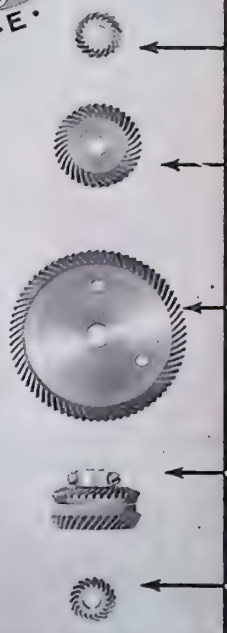
Spiral Bevel Gears

for Quiet Operation *and* Longer Life

-SUPER- LaVezzi -SERVICE-





G-283-G Vertical Shaft Top Spiral Bevel Gear (Replaces G-138-G)

G-282-G Upper Sprocket Shaft Spiral Bevel Gear (Replaces G-139-G)

G-279-G Intermediate Spiral Bevel Gear (Replaces G-135-G)

G-87 Double Spiral Bevel Gear and Clamp (Replaces G-13)

G-278-G Shutter Driving Spiral Bevel Gear (Replaces G-115-G)

They maintain continuous pitch line contact. The oblique, curved teeth engage gradually instead of coming into full contact at once like straight bevel gears. Always more than one pair of teeth in contact to share the load. And LaVezzi Spiral Bevel Gears *run themselves in with oil.* No grinding or lapping compounds required—eliminating need for clearing destructive emery out of gears and bearings.

FINEST QUALITY, PRECISION-MADE PROJECTOR PARTS

Guaranteed interchangeable. Made to extremely close tolerances and individually inspected to assure trouble free installation and smooth operation.

Available Through Independent Theatre Equipment Dealers

LAVEZZI MACHINE WORKS

4635 WEST LAKE STREET · CHICAGO 44, ILL.

STRONG

PROJECTION LIGHTING EQUIPMENT

FIRST CHOICE OF A VAST MAJORITY

There is no substitute for technical skill when it comes to producing projection arc lamps. As the only projection lamps manufactured complete within one factory, Strong lamps can be so engineered as to guarantee best screen results.

Double Your Screen Brilliancy

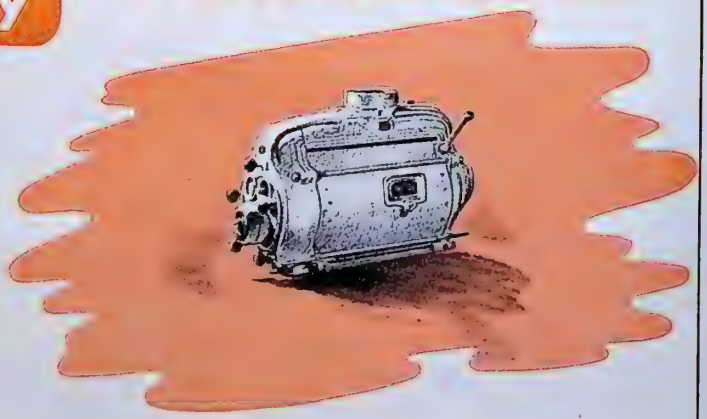
Strong, with this lamp, has made it possible for even the most modest theatre to have the utmost in projection lighting.

Film producers spend millions to give you productions which are examples of the best in photographic art. To realize their greatest potentials on your screen, however, you must project them with the same brilliant, snow-white high intensity light that is employed in film production. Only then can you obtain for your patrons all the highlights, deep shadows and intermediate values necessary to pictures of depth and fine definition.

To secure the desired screen brilliancy with the present dense black and white films, and satisfactorily present Technicolor films, twice as much light is required as is possible to project by any low intensity lamp. This necessary doubling in light over the low intensity is made possible with this lamp, at an increased combined current and carbon cost of less than 2c per hour.

Theatres everywhere are obtaining twice as bright a picture as was possible with their old arcs, by installing

STRONG 1 KW. HIGH INTENSITY PROJECTION LAMPS



A light for the moderate sized theatre using a screen up to 18 feet in width; where the vivid brilliancy of high intensity projection has been heretofore denied by prohibitive operating costs.

STRONG MOGUL 45 to 70 Ampere HIGH INTENSITY LAMPS

Designed to project a volume of light even beyond the normal requirements of theatres employing large screens of non-reflective surface, without corresponding increase in operating costs, in fact, at a lower overall cost per light unit.

When the lamps are **STRONG** *the picture is bright!*

STRONG

PROJECTION LIGHTING EQUIPMENT

STRONG 6-TUBE RECTIFIERS

Designed for use with high intensity arcs to produce exceptionally smooth output current even beyond the normal requirements of the largest theatres.

The maximum operating load is sufficiently below the capacity of the six 15-ampere tubes to result in exceptionally long life.

Regularly supplied for use on 220-volt, three-phase, 60-cycle power service. These rectifiers come in three capacities of: 50, 65 and 80 amperes.

STRONG 4-TUBE RECTIFIERS

Built in two capacities, the 40-ampere single-phase for use with the 1 KW arc lamp, and the 50-ampere three-phase for use with larger high intensity lamps, adjustable from 45 to 50 amperes with 35 volts across the arc.

The 40-ampere single-phase rectifier has the exacting volt-ampere-age characteristics and smoothing reactance to assure a stable burning 40-ampere, 28-volt arc.

The 50-ampere 3-phase rectifier has been designed especially to supply DC power to high intensity arcs that are adjustable between 45 and 50 amperes with 35 volts across the arc.

STRONG 2-TUBE RECTIFIERS

The best device for converting alternating current line supply to direct current for low intensity arc operation.

Comprised mainly of a special transformer, a radial switch for regulating the current to the desired number of amperes, two rectifier tubes, a substantial housing, and the necessary sockets, lead wires, etc. An efficiency of 75% means a saving in current, which will soon equal the purchase price. Two models, 15-ampere and 30-ampere.

STRONG COPPER OXIDE RECTIFIERS

A rugged, simple and dependable equipment for converting three-phase alternating line supply current to direct current for use with high intensity projection arcs of from 45 to 65 amps capacity.

Transformer taps provide for adjusting the output current over a wide range of amperages and voltages.

Requires no attention or maintenance. There are no moving parts to wear out, make noise or disintegrate.

Built in single lamp units and in two sizes adjustable from 45 to 50 amperes and 45 to 65 amperes.

STRONG REFLECTORS

Since the only light which can reach the screen must be reflected by the mirror, the loss in screen light during the gradual deterioration of a reflector is in direct proportion to the loss in mirror efficiency. Light losses through the use of worn-out reflectors, and amounting to several hundred dollars a year, are not unusual. Endeavoring to make up this light loss through the use of more current similarly represents a pure waste in the form of unwarranted power bills, all of which makes the cost of periodic mirror replacement a good investment.

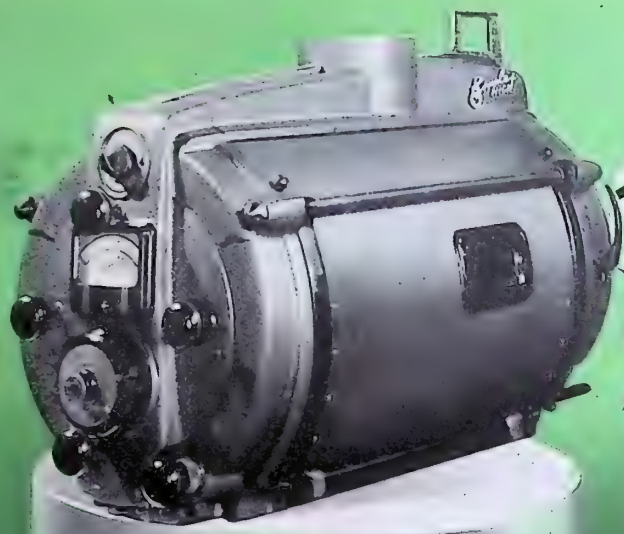
Strong precision reflectors in a variety of types and sizes for use in all standard projector arc lamps have long been recognized as a dependable standard of quality.

THE STRONG ELECTRIC CORPORATION

87 City Park Avenue — Toledo 2, Ohio

The World's Largest Manufacturer of Projection Arc Lamps

Your Pictures can be Twice as Bright!



Simplex HIGH INTENSITY PROJECTION ARC LAMPS

*Deliver twice as much light as the low intensity lamp, bringing out all the fine photographic details, with only slight increase in operating cost.

*Project the snow-white light that is absolutely essential to the satisfactory projection of Technicolor pictures. The light of the low intensity is yellow by comparison and in projection changes the color values of the film.

*Low in original cost. Within reach of all theatres.

Distributed Exclusively by

NATIONAL THEATRE SUPPLY

Division of National • Simplex • Bladworth, Inc.

"There's a Branch Near You"

FOR EFFICIENT, DEPENDABLE ARC POWER SUPPLY, NATIONAL HAS THE RIGHT RECTIFIERS

NATIONAL 4-TUBE RECTIFIER

Has the built-in volt-ampere characteristics necessary to maintain the perfect power balance required by high intensity projection lamps. The low original cost, low maintenance and high operating efficiency makes it particularly suitable in the medium sized theatre where economical operation is important. It is built in two models. The single-phase 28-volt 40-ampere capacity rectifier is designed expressly to supply D.C. power to the one-kilowatt high intensity arcs. The three-phase 35-volt 50-ampere rectifier is used to supply D.C. power to high intensity arcs of from 45 to 50 ampere capacity.

NATIONAL LOW INTENSITY RECTIFIER

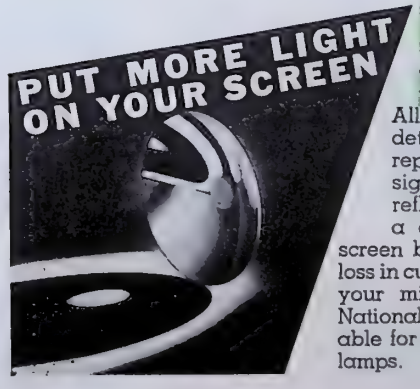
More low intensity lamps today are operated from this type of rectifier than all other means of low intensity rectification combined. The low original cost, low maintenance and high operating efficiency makes the tube-type rectifier particularly suitable in the smaller theatre where economical operation is important. Designed to withstand higher amperages, the demands of long continuous service and overloads resulting from the use of larger carbons, this rectifier is manufactured in two capacities; the large unit is adjustable from 18 to 30 amperes and the small portable unit from 10 to 15 amperes.

NATIONAL 6-TUBE RECTIFIER

The National Heavy Duty 6-Tube Rectifier has been designed as a D.C. power supply to the Magnarc Lamp, wherever used at high currents.

This rectifier employs six 15-ampere Tungar-type tubes, connected for full wave rectification on three-phase current which results in an overlapping in impulses sufficient to produce an exceptionally smooth output current.

The high efficiencies of this rectifier, coupled with the low price and long life of the modern tube, make this rectifier a most desirable, economical means of changing A.C to D.C.



NATIONAL REFLECTORS

All reflectors gradually deteriorate to a state where replacement cost becomes insignificant since the drop in reflective efficiency results in a corresponding decrease in screen brilliancy, and represents a loss in current and carbons. Replace your mirrors regularly with new National reflectors. They are available for all types and makes of arc lamps.

A UNIT OF NATIONAL STANDARD PROJECTION SYSTEM

Distributed Exclusively by

NATIONAL THEATRE SUPPLY

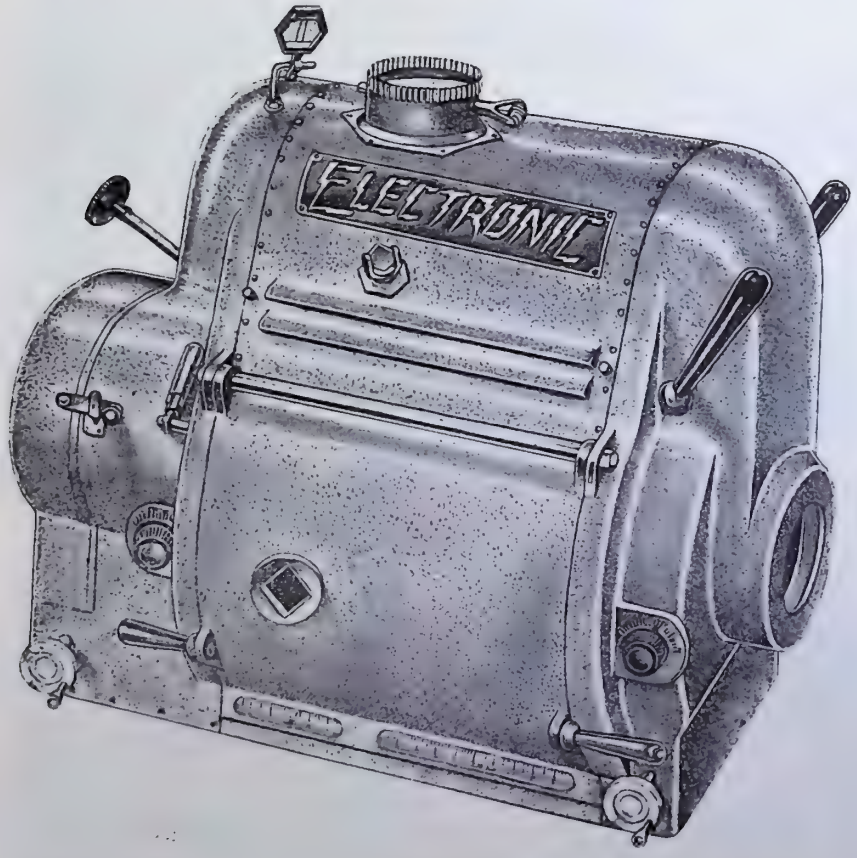
Division of National • Simplex • Bludworth, Inc.

"THERE'S A BRANCH NEAR YOU"

FOREST ARC LAMPS

The New Development in Projection Lamps that has become The Talk of the Industry!

ELECTRONIC *Control* ARC LAMP



The superiority of the Forest Electronic Control Projection Arc Lamp is the reward of long research and contemporary scientific engineering . . . incorporating the highest developments in projection efficiency for motion picture Arc lamps. It features a completely new and faultless method of feeding positive and negative carbons by ELECTRONIC CONTROL, assuring arc control of precision accuracy, maintaining the exact focal point necessary for producing maximum light intensity at all times without the necessity of the operator's constant watching and adjusting. No carbon feed motor—no gears—no clutches—no cams—no gadgets—no fast moving parts! Nothing to get out of order. Actuated and driven by solenoid instead of a motor as heretofore. An added feature is the Electronic Timer designed to give an exceptionally wide range of adjustment—exact timing for any carbon consumption can be obtained. Each lamp employs two electronic timers, one for the positive feed and one for the negative feed; built into the lamp in such a manner as to be easily removable.

LARGE LAMP *14-Inch Reflector* • **1 KILOWATT** *10¼" Reflector* • **LOW INTENSITY** *10¼" Reflector*

WRITE TO US FOR THE NAME OF THE AUTHORIZED FOREST DEALER IN YOUR TERRITORY

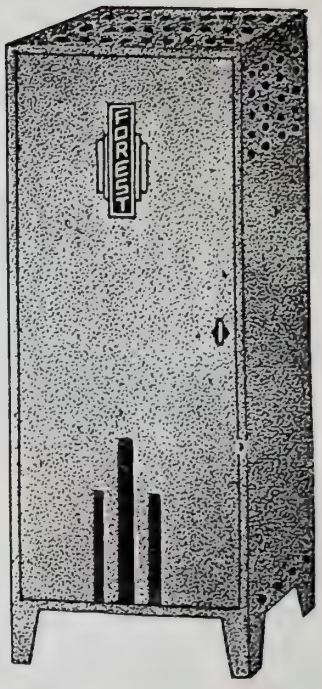
FOREST MANU

• RECTIFIERS • SCREENS

Another Forest First!

A New and Highly Improved Rectifier

SINGLE-TYPE 75-V-6 **TWIN-TYPE 75-V-12**



Six-Tube Rectifiers . . . Designed to meet the technical demands of today and tomorrow . . . achieving a new high for rectification efficiency at the lowest possible cost of power, embodying the advanced knowledge gained from building rectifiers for radar and other highly scientific projects where perfection of performance and reliability are of paramount importance. Forest is recognized as the leading manufacturer of power conversion equipment. These new and improved rectifiers are the finest for today's requirements, and also have built into them a reserve capacity to make them easily adaptable for tomorrow's improved carbon which may demand a higher amperage than at present. Designed for all theatres using Suprex or Simplified High Intensity Projection. Built-in remote control relays with provisions for operating spotlights.

- Single-Type model, 40 to 75 amperes D.C. Current.
- Twin-Type model, designed to save booth space. Operates as two units, with two built-in remote controls, same as though there were two individual rectifiers, one for each lamp. 40 to 75 amps to each.
- Full 3 Phase Rectification.
- Operates from 3 Phase A.C. Line.
- Built-in Remote Control.
- No Moving Parts.
- Constant Arc Current—No Flicker.
- Quiet Operation—Ease of Operation.
- Standard High Quality Bulbs.
- All Steel Case.
- Power With Flexibility.
- Underwriter's Listing.

SUPER MCS

Super MCS RECTIFIER

Forest Super Magnesium-Copper Sulphide Rectifier with the exclusive Forest transformer is internationally recognized for its superiority in every way. It gives definite assurance of protection from line voltage fluctuations. Some of the exclusive Forest features are: reliable 3 phase fan, magnetic switches, automatic voltage regulator—housed in a sturdily built modern design case. Approved by Underwriters Laboratories.

LD-60 Bulb-Type RECTIFIER

LD-60 Bulb-Type Rectifier is acclaimed for its reliability, efficiency, and low cost power conversion device to supply projection arcs. Forest rectifiers conform in every way to the standards required for modern projection. Each rectifier serves one lamp and has an output from 30 to 60 amperes for Simplified High Intensity operation. This rectifier, with the Forest Lamp, meets the demand of the smaller theatre where an inexpensive source of light is required.

LD-60

LD-30 RECTIFIER

Low Intensity Rectifier—a bulb-type rectifier of dependability with ample amperage leeway to insure reserve power. Housed in sturdy all steel case.

RECTIFYING TUBES

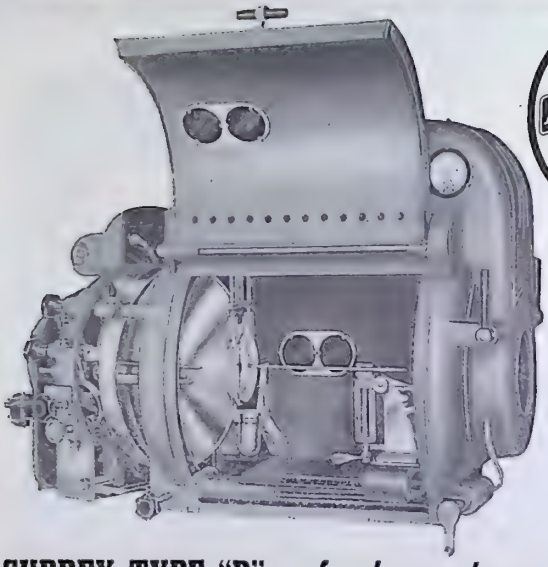
For rectifiers, power supply units and battery chargers of all makes. When used in Forest Rectifiers you are assured of maximum efficiency, reliability of operation and maximum economy.

SOUND SCREENS

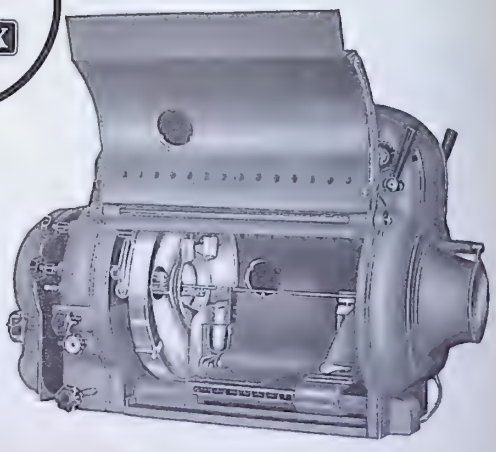
The special Forest Surface-Processing Method eliminates the necessity of increasing amperage at the arc to obtain increased light on screen. They are all flame-proofed.

ACTURING CORP. 60 PARK PLACE, NEWARK 2, N. J.

PROJECTION AT ITS BEST



ASHCRAFT SUPREX

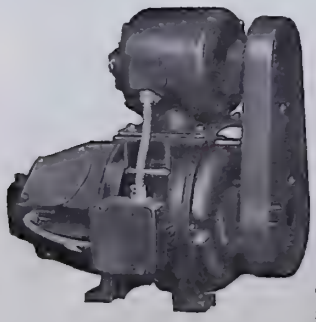


SUPREX TYPE "D" — *for large theatres*

Amplified High Intensity. Maximum brilliant-white screen illumination at its best—designed to meet the exacting requirements of the most critical technician or exhibitor. Its recognized superiority of light output and dependability has become the standard of projection in many of the world's largest theatres where nothing but the best will be considered. No finer lamp is made. It represents the utmost in contemporary engineering—every improvement, appliance and convenience known in modern science for better projection has been incorporated plus the advantages of many exclusive patented features found only in Ashcraft products.

SUPREX TYPE "E"—*medium theatres*

An Intermediate High Lamp, the mechanism and housing was specially designed for Medium or Low Amperage Suprex and not converted from ordinary Low Intensity lamps. For this reason this model can be operated over a wider range—a true Intermediate High—27 volts, 40 amperes or can be used in the normal Suprex range (35 volts up to 50 amp.) Among its many features are: 14-inch Bausch & Lomb Reflector; independent feed for each carbon; full collapsing mirror protecting douser; separate mechanism chamber to keep the operating parts clean and cool.

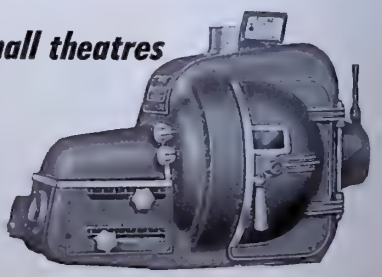


Cyclex *for medium and small theatres*

A TRUE ONE KILOWATT ARC LAMP

CYCLEX POWER UNIT

This sturdy unit eliminates the necessity of generators or rectifiers — converting alternating current, for use in the arc, which produces a smooth brilliant screen light. One of the most economical and long lived units ever designed for motion-picture projection.



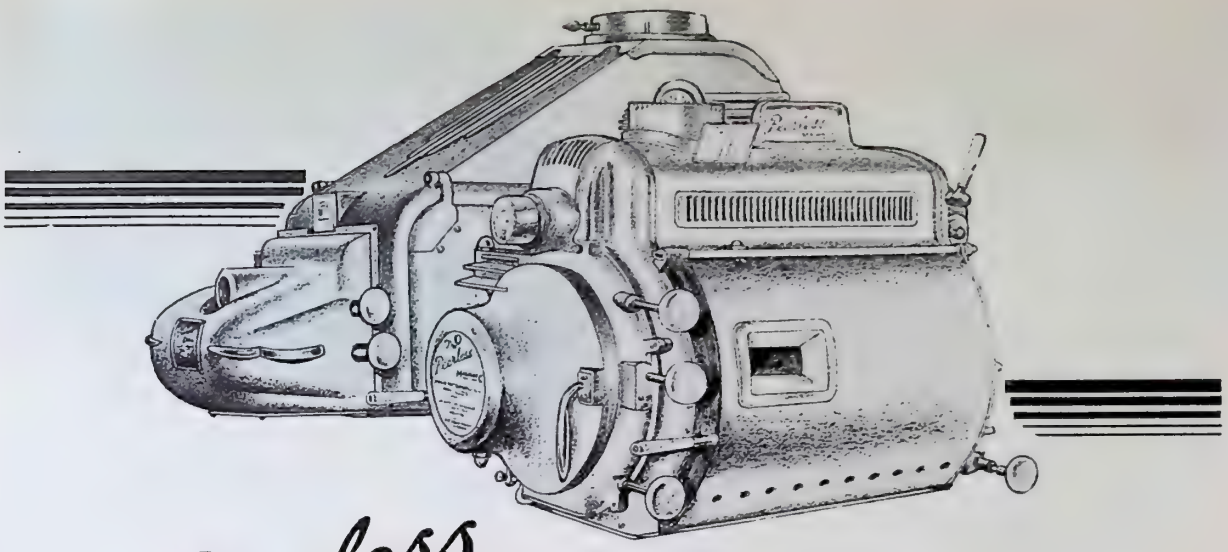
CYCLEX LAMP

High Intensity Light at less than low intensity operating costs. Cyclex light is ideal both for black and white or technicolor prints. Structurally the lamp is simple and strong, being equipped with every convenience for easy and efficient operation. *Cyclex light is steadier than that from arcs operated from rectifiers.*

"SUPREX" and "CYCLEX" *are registered trade-marks with the U. S. Patent Office and are the sole property of C. S. Ashcraft Mfg. Co.*

C. S. Ashcraft Mfg. Co.

LONG ISLAND CITY, N. Y.



Peerless HY-CANDESCENT ARC LAMP
TRADE MARK REG

120-180 Amperes

Peerless MAGNARC
TRADE MARK REG.

1 K.W. to 70 Amperes

THE WORLD'S MOST WANTED ARC LAMPS

THERE are many attributes which make Peerless arc lamps the World's most desired.

Each exemplify the requisites for building a superior arc lamp, high purpose, unexcelled facilities and a long background of quality experience.

Every Peerless lamp has back of it a heritage that embraces the ideal that — no finer product will ever be available to the user.

In consequence no comparable example of engineering skill and precision workmanship will ever exist.

"INSTALLED ON THE S.S. QUEEN ELIZABETH"

J.E.McAULEY MFG.CO.

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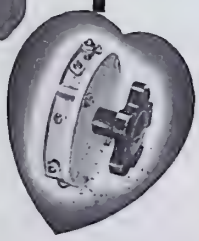
THE *Heart of the Unit*



Patent Applied For

PROJECTION KNI-TRON EQUIPMENT RECTIFICATION

for EFFICIENT PERFORMANCE and DEPENDABLE ECONOMICAL OPERATION

New, Improved, Electrical Design and Mechanical Construction plus Low Cost Operation—are the built-in features of every KNI-TRON Rectifier. It Costs No More to Buy KNI-TRON Rectifiers.

NEW DE LUXE KNI-TRON RECTIFIER

The new Positive Action Rotary Switch gives the users of Kni-Tron Rectifiers complete current control. Long life—trouble-free operation is built into every Kni-Tron unit.

The up-to-date modern designed case plus the many KNI-TRON engineered features makes this unit the last word in rectifiers. The fully enclosed dial switch . . . the rugged Transformer unit . . . the mechanical mounting of the transformer directly to the supporting resilient feet of the unit, eliminates operating noises.

On the single phase high intensity units the output current is filtered through a massive choke coil to assure flickerless projection.

KNI-TRON MASTER RECTIFIER

- EFFICIENT, COMPACT AND LIGHT WEIGHT.
- IDEAL FOR PORTABLE USE.
- MANY FEATURES OF THE DE LUXE KNI-TRON RECTIFIERS ARE ENGINEERED INTO THIS UNIT.

KNI-TRON 10¼" Reflector Equipment

50 to 70% MORE SCREEN LIGHT FROM YOUR LOW INTENSITY LAMPS

No expensive new equipment to purchase. KNI-TRON 10¼" CONVERSION KITS complete with Bausch Lomb Reflectors can be installed in a few minutes.

KNI-TRON 10¼" CONVERSION KITS are made for the following Low Intensity Lamps.

PEERLESS • STRONG • MOTIOGRAPH • ASHCRAFT PREDDEY • SUNBEAM • BRENKERT MODELS "E" AND "P" POWERLITE

No Extra Operating Costs!

SPECIFICATIONS of KNI-TRON RECTIFIERS

Ref. Number	Type of Rectifier	D.C. Amps.	D. C. Volts	A.C. Voltage	Phase	Overall Dimensions	Net Wgt.	Shipping Wgt.	Tubes Required (Tungar)
15-PL	Master Low Intensity	15	50 to 55	110 or 220	Single	12x12x9	48 lbs.	54 lbs.	2-6 Amp.
30-PL	Master Low Intensity	30	50 to 55	110 or 220	Single	12x12x11	61 lbs.	66 lbs.	2-15 Amp.
30-SL	Standard Low Intensity	30	50 to 55	110 or 220	Single	22x12x9	65 lbs.	72 lbs.	2-15 Amp.
40-SH	Stand 1 K.W. High Intensity	40-45	25 to 28	110 or 220	Single	22x12x14	135 lbs.	155 lbs.	4-15 Amp.
45-SH2	Standard High Intensity	45-50	31 to 40	220	Single	22x12x14	137 lbs.	160 lbs.	4-15 Amp.
45-SH3	Standard High Intensity	45-50	31 to 40	220	Three	22x12x16	137 lbs.	160 lbs.	4-15 Amp.
65-SH3	Standard High Intensity	60-65	31 to 40	220	Three	24x12x20	160 lbs.	190 lbs.	6-15 Amp.

Write for further information and prices

The Kneisley Electric Company

TOLEDO 3, OHIO, U.S.A.

A NEW SOURCE OF *Smoother* RECTIFIED POWER FOR MOTION PICTURE PROJECTION!

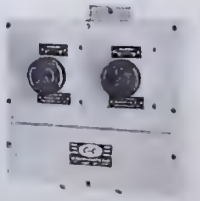
C and C PRODUCTS

Six PHASE ARC LAMP RECTIFIER

TYPE H2870
D.C. RATING
70 AMPS
35 VOLTS

70 AMPERE CAPACITY WITH SELF-HEALING MAGNESIUM-COPPER SULPHIDE STACKS

- ★ GIVES A BEAUTIFUL, SMOOTH, FLICKERLESS LIGHT WHICH FAR SURPASSES THAT OF ORDINARY SINGLE OR THREE-PHASE FULL WAVE RECTIFIERS
- ★ RESULT OF 15 YEARS OF RESEARCH AND DEVELOPMENT OF ELECTRICAL RECTIFIERS
- ★ OPERATES ON STANDARD THREE PHASE POWER LINES
- ★ USED BY LEADING MAJOR STUDIOS, CIRCUIT AND INDEPENDENT THEATRES FROM COAST TO COAST
- ★ APPROVED BY UNDERWRITERS' LABORATORIES



TYPE "C" TRANSFER SWITCH BOX

NO MORE "BLACK SCREENS." Install the "C&C" Transfer Switch and eliminate embarrassing "Black Screens." Interconnected with your rectifiers, the "C&C" Transfer Switch makes possible a quick transfer in the event of failure of a power supply unit. Greatly simplifies installation . . . easy to operate. Finished in attractive grey enamel.

Dimensions of panel: 12" by 12".
Depth of box: 3½"

"START-STOP" Pushbutton Switch Type 6367 for remote control of A.C. power to Rectifier. Eliminates D.C. switches on lamps. Mount Pushbutton on or near Projector and save power by turning A.C. "off" when not projecting.

FOR A COMPLETE RECTIFIER INSTALLATION, WE RECOMMEND

2 — "C&C" Type H2870 Rectifiers.
1 — "C&C" Type C Transfer Switch Box.
2 — Remote Control Push Button "Start-Stop" Switches, Type 6367.

Manufactured by

McCOLPIN-CHRISTIE CORPORATION, LTD.
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LOS ANGELES 37, CALIFORNIA
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RCA THEATRE EQUIPMENT

Everything for the Theatre!

RCA THEATRE SCREENS

RCA SNOWHITE SCREEN—For all types of theatres using high intensity light sources. The surface has high diffusion properties and reflects all colors equally well with 85% efficiency. It is furnished with uniform perforations, patented Evenlight perforations, or unperforated as desired.

RCA HEAVYWEIGHT SNOWHITE SCREEN—This screen has the same surface and type perforations as the Snowhite Screen. It has extra weight to supply the strength needed for the large screen sizes.

RCA SILVERLITE SCREEN—For narrow theatres using low amperage (low intensity) light sources. The surface has superior reflecting and non-tarnishing qualities, and is supported by a high quality material which may be supplied perforated for sound transmission or unperforated as desired.

CENTURY-ROTH GENERATORS

Highly efficient motor-generator, produces a steady source of direct current which guarantees the unvarying brilliance necessary for good screen projection.

SIMPLICITY—No small complicated parts, tubes, or relays.

STABILITY—Steady direct current output is independent of variations of voltage in the alternating current power source.

EFFICIENCY—No transformers or choke coils. Performance characteristics unaffected by age.

CAPACITY—Will withstand heavy momentary overloads.

TRUE DIRECT CURRENT—Non-pulsating, will not synchronize with shutter.

WESTINGHOUSE RECTIFIERS

Highly efficient power sources for the proper operation of Suprex types of arc lamps. Excellent performance and low operating cost.

May be installed anywhere in either projection-room or power-room. Quiet running—no vibration.

Simplicity and serviceability are keynotes of this design. Negligible maintenance costs.

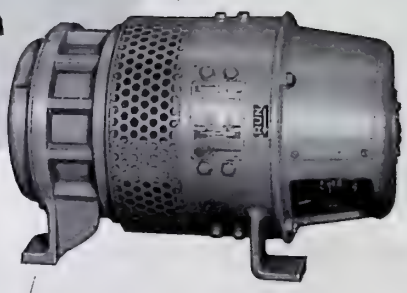
Functionally designed. Front exhaust from ventilating fan prevents blocking of air. Styled and finished to match all type of projection equipment.

FOR FURTHER INFORMATION SEE YOUR RCA THEATRE SUPPLY DEALER

There is a TransVerteR

Reg. U. S. Pat. Off., July 25, 1916

for every projection-room requirement



For more than 30 years, Hertner motor-generator equipment has been giving motion-picture theatres continuous service. Today's Hertner Transverter motor-generators are specially designed to deliver proper constant-voltage power for high-intensity projection at low operating cost.

There's a Transverter for every projection-room requirement:

With Transverter equipment you are sure of (1) reliable performance, (2) constant screen illumination, (3) quiet operation, (4) low operating cost, and (5) long life.

Transverter Type C.P. (90-100 volt) or M. A. — for high-intensity condenser (straight high intensity).

Transverter Type H. I. (42-50 volt) — for Suprex Projectors.

Transverter Type H. I. H. (60-70 volt) —for Suprex Projectors and Spot Lamps with 40-50-volt arc.

Transverter Universal Type (45-48 and 90-96 volt)—for Suprex Projectors, Spot Lamps, Dissolvers and all types of projection lamps.

Transverter Type "LV" (33 volt) — for low-voltage, high-intensity projector (1 K.W. arc).

THE HERTNER ELECTRIC COMPANY

Exclusive Manufacturer of the Transverter

A GENERAL PRECISION EQUIPMENT CORPORATION SUBSIDIARY

12600 ELMWOOD AVENUE • CLEVELAND 11, OHIO

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MOTOR GENERATORS AND MOTORS FOR EVERY REQUIREMENT

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Stedypower

"The Power Behind the Screen"

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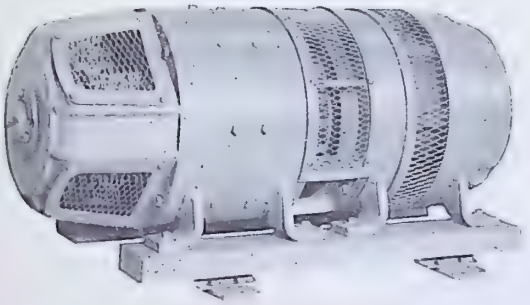
Standard and Custom Built motor-generators, frequency changers, Diesel electric sets for every motion picture purpose anywhere in—

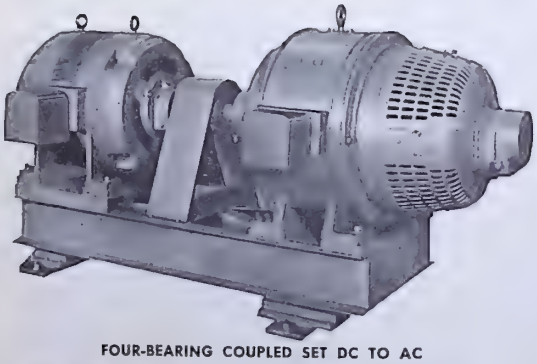
THEATRE • STUDIO • TELEVISION

Designed specifically for the service. Not just motors or generators, but a guarantee of service—power plants with 57 years' electrical know-how and 41 years' motion picture experience "Built-in!" **The means of avoiding power failures.**

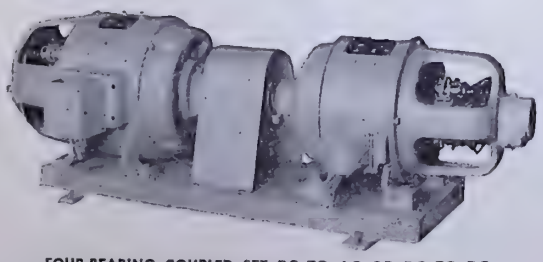
SEE YOUR INDEPENDENT THEATRE SUPPLY DEALER OR WRITE FOR LITERATURE



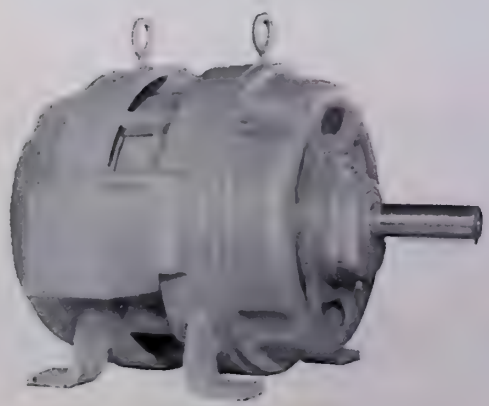
TWO-BEARING MOTOR-GENERATOR SET



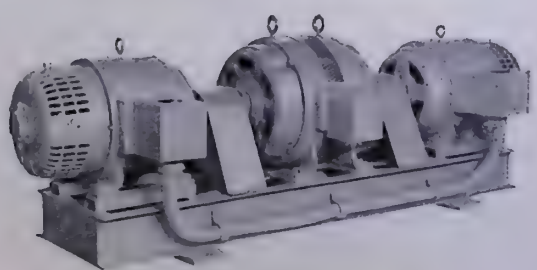
FOUR-BEARING COUPLED SET DC TO AC



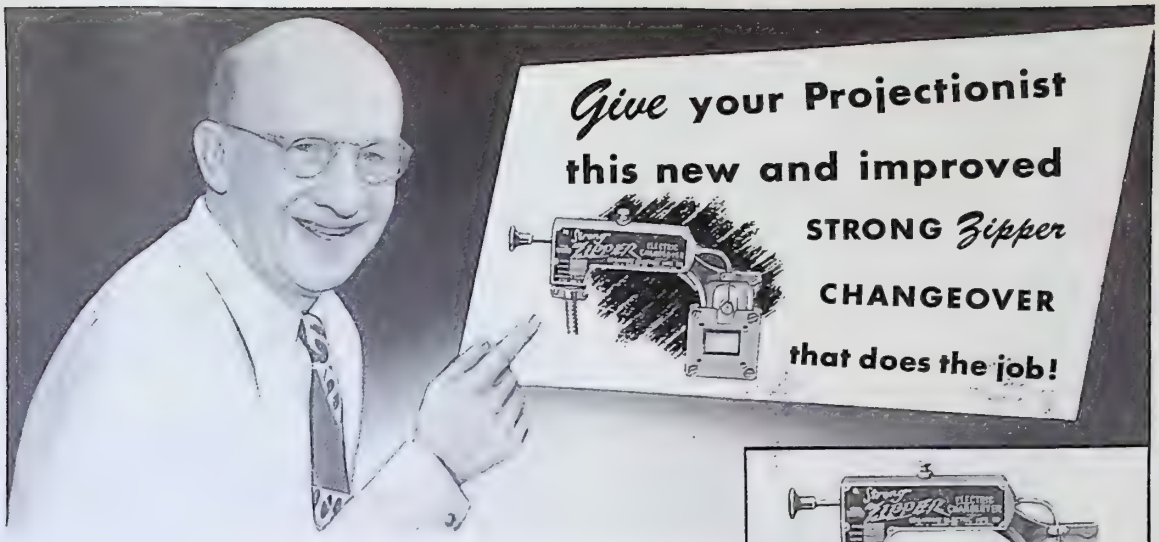
FOUR-BEARING COUPLED SET DC TO AC OR DC TO DC



GENERAL PURPOSE OPEN SQUIRREL CAGE MOTOR



THREE UNIT 6 BEARING COUPLED SPECIAL SET



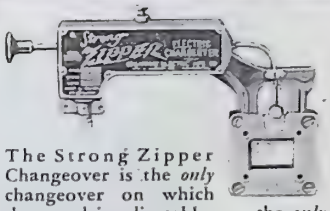
Give your Projectionist this new and improved STRONG *Zipper* CHANGEOVER that does the job!

NOW . . . NEW . . . Strong Zipper Changeovers are equipped with thermostats to eliminate burn-outs . . . Hand-switch levers front and rear to permit operation from either side . . . Easily accessible terminal block . . . and a streamlined design in keeping with the Projectionist's specifications.

Strong Zipper Changeovers are available in three standard models: (1) Strong *Special* changeover for porthole installations; (2) Strong *Zipper picture* changeover for projection-head mounting; and (3) the new Strong *Dual-Purpose Zipper* changeover for sight and sound.

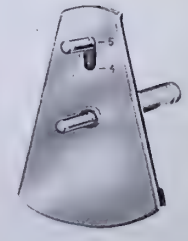
Strong Zipper Changeovers are factory-installed, standard equipment on the *new* MOTIOGRAPH, on post-war BRENKERTS—and on the new DeVRY theatre projectors.

Built by a Projectionist whose 35 years of projection booth experience taught him the keen desire of every Projectionist—to give the "*perfect show,*" Strong Zipper Changeovers, Strong Reel End Signals and Strong Universal Rewind "Mules" warrant the Exhibitor's purchase-approval in the interest of audience satisfaction. ESSANNAY ELECTRIC MANUFACTURING COMPANY, 1438 N. Clark, Chicago, Illinois.
EXPORT: *Westrex Corporation, 111 8th Ave., New York 11.*



The Strong Zipper Changeover is the *only* changeover on which the speed is adjustable . . . the *only* changeover guaranteed by *both* manufacturer and jobber. The Strong Zipper Changeover is the *only* changeover using a flexible shaft, thus eliminating all rods, connection bolts and locksprings, which jam or wear out, thereby disrupting an otherwise perfect performance. Strong Zippers are available for all standard projectors.

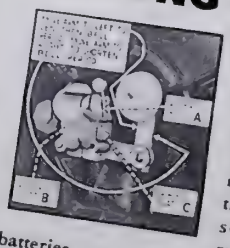
STRONG UNIVERSAL REWIND MULE



No more delayed shows, due to broken rewind keys and shafts . . . No more fevered dismantling of vital equipment to install new parts . . . No more need for makeshift rewind collars in the projection booth . . .

Simple, rugged, and positively foolproof, the new STRONG REWIND Drive "Mule" fits any enclosed rewind. A flick of the thumb, and it is set to take 4″, 5″ and Exchange reels.

STRONG REEL-END SIGNALS



STRONG REEL END SIGNALS are available for all projectors. Do not touch film or reel, thus eliminating film scratching. Strictly mechanical, require no batteries, no transformers, no governors, and no presetting. Strong REEL END SIGNALS can be installed in five minutes . . . can be counted on for years of day-in, day-out, trouble-free service.

STRONG'S *Zipper* CHANGEOVERS

ESSANNAY ELECTRIC MANUFACTURING CO. . . . 1438 NORTH CLARK STREET, CHICAGO 10, ILLINOIS

BAUSCH & LOMB
OPTICAL SYSTEMS

. . . for More Effective Presentation of Sound Motion Pictures

TO HELP increase audience appreciation of sound motion pictures, Bausch & Lomb makes available a wide selection of lenses and optical systems. B&L camera lenses, optical systems used in sound recordings and reproduction, projection lenses, condensing systems, and reflectors incorporate the newest developments in optical science.

A typical example of B&L research and skill in precision optics for motion pictures is the Super Cinephor *f*:2.0 projection lens. Balcote surfaced, it gives maximum brilliance, contrast, and definition on the screen. Offers a 70% total gain in speed over the previous series when used with an illuminant of sufficient angular aperture. Focal lengths from 2″ to 5″ in ¼″ stops.

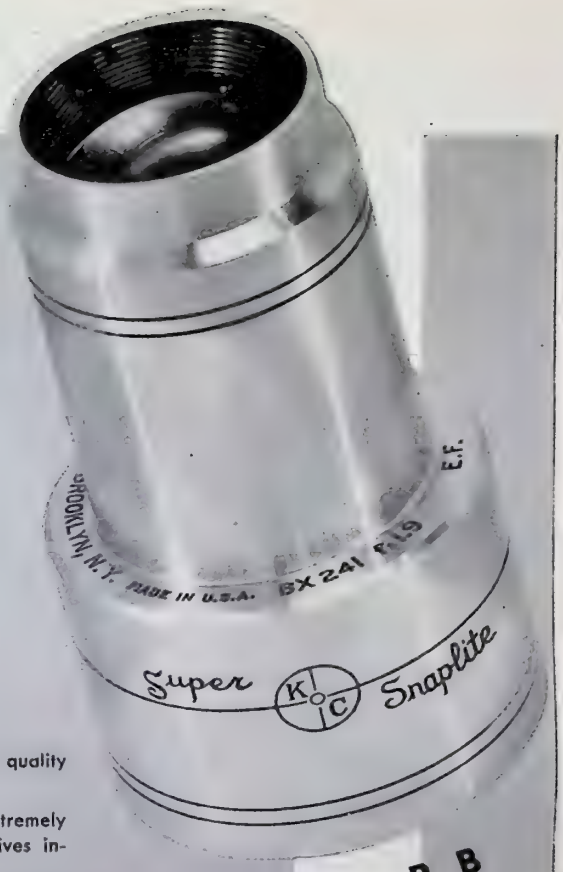
Whatever your projector, filming, or recording optical requirements, consult Bausch & Lomb. Bausch & Lomb Optical Company, 761 St. Paul Street, Rochester 2, New York.

BAUSCH & LOMB

ESTABLISHED 1853

FOR UTMOST IMAGE QUALITY:

THE f/1.9
SUPER-SNAPLITE
6-ELEMENT ANASTIGMAT



COMPARE THESE ADVANTAGES!

- [illegible] . . . Six elements for wide-angle, high-magnification, wire-sharp projection!
- [illegible] . . . magnificent screen brilliance!
- [illegible] . . . greater light, sparkling contrast!
- [illegible] . . . trouble-free performance; dustproof, oilproof!
- [illegible] . . . can't flake off!

Wider-angle projection . . . higher magnification . . . utmost image quality are yours with the spectacular new Super-Snaplite!

Because it's a true anastigmat, the Super-Snaplite produces extremely high magnifications, in short throws, with exceptional detail — gives incomparable image quality in longer throws!

And this superb performance is *permanent* — thanks to the hermetically sealed, one-piece high-strength aluminum alloy mount! The Super-Snaplite is dust-proof, moisture-proof, oil-proof — never needs to be taken apart for cleaning! The anti-reflection coating is hard, durable, too!

Focal lengths range from 2" through 5" in ¼" steps. Speed of f/1.9 is maintained throughout. Get the complete details of the new Super-Snaplite by writing for Bulletin 203!

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IMMEDIATE DELIVERY ON SNAPLITES I & II

The Series II Snaplite provides a speed of f/2.0 in focal lengths of 3½" through 5" . . . has durable anti-reflection coatings . . . features a one-piece, hermetically sealed aluminum alloy mount with integral black-anodized finish. For less exacting requirements, the Series I is stocked in a wide range of focal lengths.

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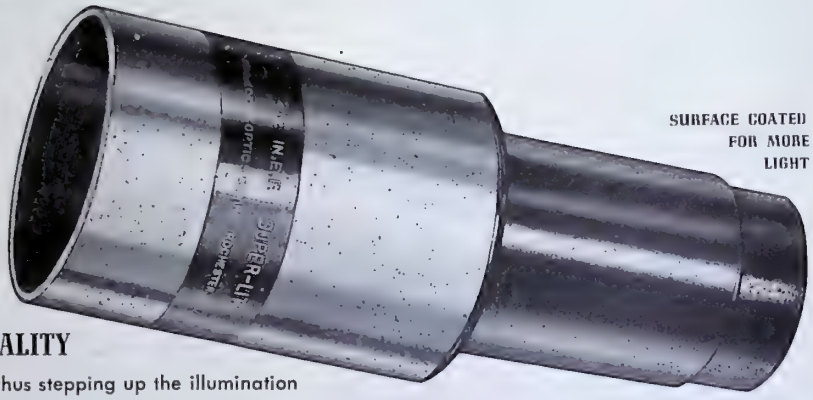
SUPER-LITE
The masterpiece of Lens-crafting

UNSURPASSED LENSES FOR CLEARER, BRILLIANT PROJECTION



SURFACE COATED FOR MORE LIGHT

SUPER-LITE SERIES III-C

THE LENS OF SUPERIOR QUALITY

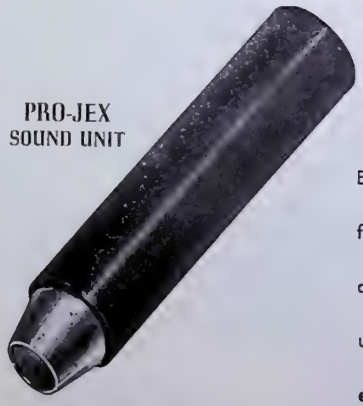
The lens without reflections or glare, thus stepping up the illumination by 20% to 25%. This exceptional increase in light is the answer to an ever growing demand for greater operating economy. Diameter 2 25/32" from 3¾" E.F. in ¼" steps, fitted for all standard projectors. Super-Lite is also available with untreated surfaces as "Series III."

SUPER-LITE SERIES I-A

2¾"—10" E. F.

A modification of the Petzval lens for the more discriminating projectionist. Diameter 2⅛" for Simplex, Motiograph, and Super-Simplex projectors; 2 1 32" for Powers projectors. Improved optical corrections—a step towards our high speed Series III and III-C.

PRO-JEX SOUND UNIT



This formula is presented after comprehensive optical studies supported by the experience of the best sound experts. The image of the slit on the film is perfectly connected and therefore the interrupted light is free from any distortion which would affect the photoelectric cell. A dust-proof and fool-proof casing insures maintenance of adjustment produced by the highest standards of manufacture and inspection.

Your Audiences Know Quality

Exacting patrons today demand the finest true-to-life projection in black and white or color. As the only manufacturers of fine projection lenses **exclusively** for many years, we have necessarily pioneered in the design and production of lenses of unsurpassed brilliance, illumination and definition. Comparison alone can prove our claims. All lenses are available either coated or uncoated.

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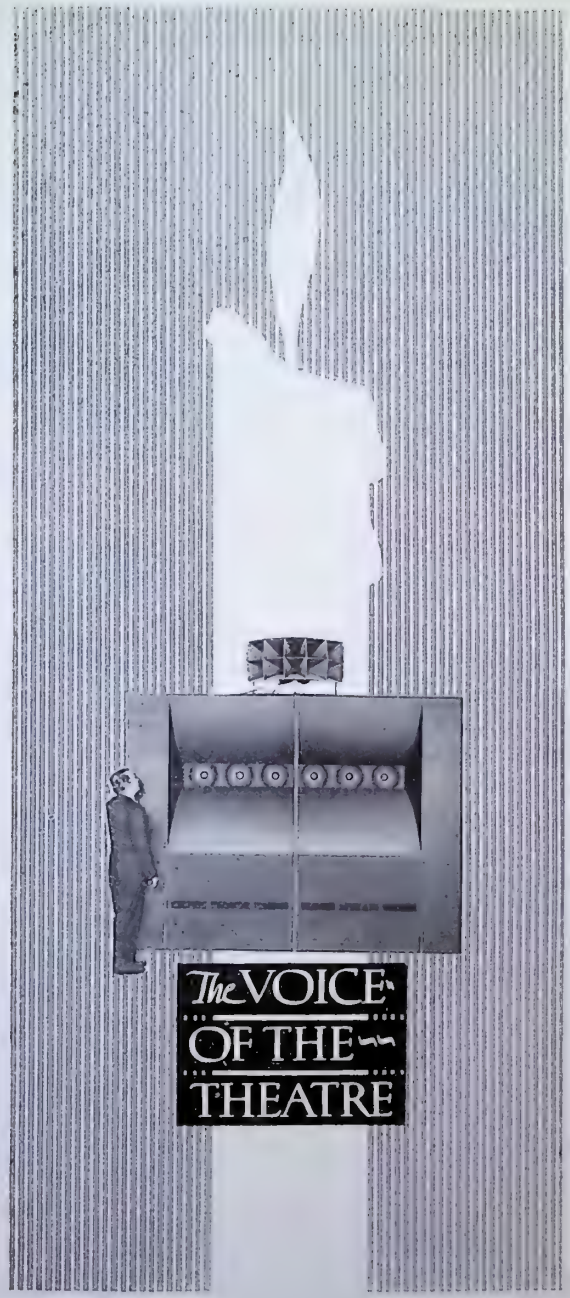

A one-year-old with a long History

It's more than a coincidence
that we celebrate the first anniversary
of THE VOICE OF THE THEATRE
at the same time that we celebrate
the twentieth anniversary
of sound films. They're part of the same story.
You might give it an impressive title
like: "History of Progress in Motion Pictures."

Remember, twenty years back,
the handful of theatres that sported
announcements of "talkies"?
You recognized them as the
up-and-coming houses; before
long, you counted yourself among them.

Today, if you were to look
at the list of more than 2000
VOICE OF THE THEATRE houses,
you'd again see the names
of the finest theatres.

Call it foresightedness or showmanship.
These theatres celebrate and sell
their VOICE OF THE THEATRE
installations as a mark of prestige
. . . and you should be among them now.

The Voice of the Theatre is available through:

THEATRE SUPPLY DEALERS
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SOUND SYSTEM MANUFACTURERS
•
ALTEC REPRESENTATIVES
in the United States

NORTHERN ELECTRIC CO.
•
DOMINION SOUND EQUIPMENTS, LTD.
•
WESTREX CORPORATION
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KEEP ADVANCING WITH ALTEC LANSING

MAKE EVERY SEAT A CENTER SEAT

WITH THE

RETISCOPE

CONCAVE SCREEN

Shaped Like the Retina of the Eye

●

Absolutely eliminates image distortion at all points in the auditorium.

PERFECT FOCUS: No special lens required.

Made of "Fiberglas," laced to a curved, movable, metal frame.

Gives illusion of depth to picture.

Reduces glare, hot spot and eyestrain.

IMPROVES SOUND: The glass cloth fibers react like a "million" baffles for the sound waves, resulting in a less directional effect.

ABSOLUTELY FIREPROOF
PRACTICALLY INDESTRUCTIBLE
WASHABLE AS A WINDOW

Installations in various theatres throughout the country and abroad will convince you of the valuable features found only in this screen.

Adapted to any theatre. Each RETISCOPE SCREEN is engineered to meet exactly the requirements of your theatre.

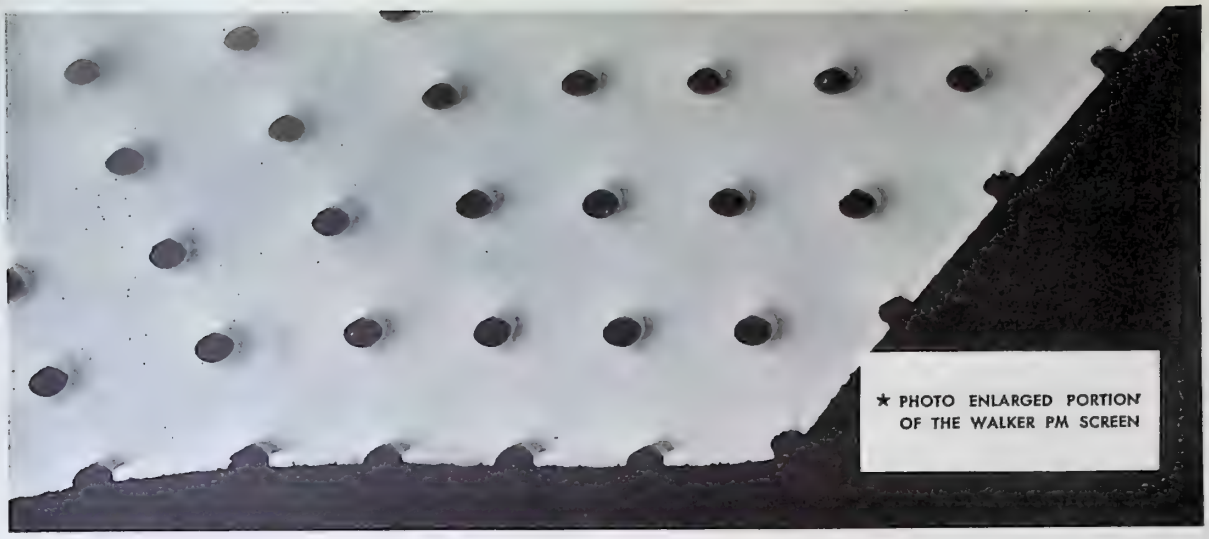
The RETISCOPE SCREEN has been developed by Advance Research Corporation from products of Owens-Corning "Fiberglas" Corporation and The Sparks-Withington Company

●

RETISCOPE SCREEN COMPANY

INCORPORATED

501 MADISON AVENUE • NEW YORK 22, N. Y.



WALKER PLASTIC MOLDED SCREEN

BRINGS NEW RICHNESS AND BEAUTY TO THE FILM IMAGE

This unique construction adds, to the picture, new BRILLIANCE, DEPTH and REALISM. Widespread use by American and Foreign exhibitors since its introduction in 1940 is proof of its practical qualities. The durable molded plastic surface delivers superior projection and sound throughout its long life.

PM–is molded of tough, durable plastic in a continuous surface without seams up to 22′-6″ x 34′-0″.

PM–sound transmission holes are molded in the shape of smooth flaring horns. The holes are not perforated.

PM–has a surface of tiny curves giving depth to the screen.

PM–plastic surface is hard and smooth which resists dirt and lends itself to quick effective cleaning.

PM–produces a strong illusion of depth in the picture.

PM–sharply reduces distortion from side seats, improves front seat viewing.

PM–provides clearer sound . . . better high frequency audibility.

PM–performance can be maintained at top efficiency for at least three years by cleaning with Walker P.M. chemical cleaner.

WALKER - PM - SCREENS

A UNIT OF NATIONAL STANDARD THEATRE EQUIPMENT

Distributed

NATIONAL THEATRE SUPPLY
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National

TRADE-MARK

PROJECTOR CARBONS

FOR EVERY TYPE OF PROJECTION LAMP

Sold through Authorized Distributors

SCREEN LIGHT AVAILABLE FROM HIGH INTENSITY PROJECTION LAMPS*

Type of Lamp	Type of Carbon	Size	Maximum Recommended Arc Current Amperes	Arc Volts	Maximum Screen Lumens 90° Shutter	Maximum Screen Width with 9 Ft. Lamberts at Center— 75% Screen Reflectivity
Condenser Type	High Intensity, White Flame Positive "Orotip" Cored Negative	13.6 mm x 22 in. ½ x 9 in.	150	78	9750	38.2
	Super High Intensity, White Flame Pos. Heavy Duty "Orotip"	13.6 mm x 22 in. ½ x 9 in.	170	75	10750	40.5
Simplified High Intensity	Suprex Cored Positive Suprex Cored Negative	7 mm x 12 or 14 in. 6 mm x 9 in.	50	37	5000	27.2
	Suprex Cored Positive Suprex Cored Negative	8 mm x 12 or 14 in. 7 mm x 9 in.	70	40	7000	31.6
"One Kilowatt Arc" D.C.	Suprex Cored Positive "Orotip" C. Negative	7 mm x 12 or 14 in. 6 mm x 9 in.	40	27.5	3250	21.9

*(*All data based on use of F/2.0 treated projection lenses*)

The words "National" and "Orotip" are trade-marks of National Carbon Company, Inc.

NATIONAL CARBON COMPANY, INC.

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HIGH INTENSITY PROJECTION

The history of screen lighting, even from the beginning, has been one move after another to obtain more and better light. High intensity projection has always produced enthusiastic response from theatre patrons, since they notice and show favorable reaction to the improvement resulting from installation of this type equipment.

High intensity lamps provide a greater volume of screen light than the older low intensity lamps. This allows a clear cut screen image to be shown in the presence of a safe and comfortable level of general illumination. Patrons entering the auditorium from the lobby find their seats without discomfort or embarrassment, while the lighter contrast between the screen and surrounding illumination adds to visual comfort in viewing the picture.

A further advantage of the high intensity arc for projection is the snow white quality of its light. Light from the low intensity arc is comparatively dull and yellowish. This distorts the hues of color features and detracts from the impression of realism which color is designed to create. High intensity projection reproduces all colors with great fidelity and gives a realistic quality to color features not otherwise obtained.

"ONE KILOWATT" ARCS

From the standpoint of the small theatre, the "One Kilowatt," carbon arc ranks among the most important advances in the art of motion picture projection. It enables the smallest theatre, at little or no increase in operating cost, to have the advantages of snow white projection light and the recommended level of illumination on the screen. It removes the edge enjoyed by those theatres having the more expensive types of high intensity lamps.

One of the most important objectives in preparing for future business is improvement in the quality and quantity of screen illumination, especially since increased production in color films is expected. No theatre will be a modern theatre without high intensity projection.

The "One Kilowatt" arc, without increasing operating cost, now allows the small theatre to give its patrons 50 to 80 per cent more screen light, more realistic color reproduction, and a quality of picture presentation unsurpassed by any theatre, regardless of size.

SECTION 9-E
HEATING VENTILATING
AIR CONDITIONING
1946-47

Indoor Comfort Pays Off at the Box Office

Proper Air Conditioning, Properly Managed, Gives the Cinema Patrons Home-Like Comfort

What does the average movie-goer look for when he visits his favorite theatre? Why does he have his favorite theatre? These two questions could be called the key to the entire promotional aspect of the theatre industry.

First of all, the average movie-goer looks for the best in film entertainment. Secondly, he looks and demands physical comfort so that he may relax and more thoroughly enjoy his favorite actors and actresses on the screen.

The two go hand in hand. Ten years ago an Academy Award winner shown in an old ramshackle store might have drawn a full house. But not so today for the public is comfort conscious and seeks it not only at home but at work and at play.

The theatre industry has kept pace with other businesses in satisfying the public's desire for comfort. The modern theatres, equipped with the latest type seats, excellent acoustics, improved visibility, attractive lounges and appealing decorations, are a far cry from the cold-appearing, creaking and dingy theatres built many years ago.

Today, no theatre can be called completely comfortable unless the air conditions within the theatre are satisfactory. The soft, easy cushions on the seats, the staggered seating plan which affords increased vision, the soft lighting, all will be to no avail if the theatre patron has to smother and swelter or freeze and sneeze.

The average theatre patron has always been very conscious of the air conditions within the theatre. He forever was objecting to the drafty gusts of extreme hot or cold air that swept through the immense spaces of the theatres built during the early 1900's. Often he and his family stayed away from the theatre because he felt that improper air conditions could cause infectious diseases such as colds, grippe and influenza.

Today, that feeling still persists, and perhaps rightly so, and is one which must be remedied by theatre managements. There are still too many prospective patrons who stay away from their neighborhood theatres because the air conditions are not adequate. In addition, there are many regular patrons who pick their theatre because of the adequate air conditions provided which offer complete comfort.

It is obvious that one way to correct these situations is for the theatre management to provide comfortable air conditions for his patrons and publicize the fact. Everyone can remember how the public flocked to the theatres one summer about 15 years ago when it was publicized that the theatres offered "complete air conditioning." Although the term air conditioning was mis-used and has been ever since, it did prove the fact that the public was conscious and desirous of more comfortable air conditions in the theatre. In this case they were seeking comfort in the form of a cool air which served as a relief from the hot and sultry air of the summer weather.

The term air conditioning means more than just the cooling of air. Actually there are many factors which govern the conditions of air which will provide the human being with a feeling of complete comfort. Such air conditions could be called true indoor comfort.

FACTORS IN CONDITIONING

There are seven factors of conditioned air, all of which may be attained in a theatre. In addition to providing complete year round comfort, conditioned air will also benefit the patron by creating a healthy indoor atmosphere. Also, proper air conditions have a great effect in the preservation of interior furnishings, maintenance and operation of the theatre, representing large savings in overhead.

As comfort and top film entertainment go together to make successful theatre operation, so go the seven factors of air conditions to make complete and satisfactory comfort. Without all seven, if one or two are lacking, there will be a feeling of discomfort suffered by a theatre patron.

The seven factors of conditioned air necessary for indoor comfort within the theatre are as follows:

Heated or Cooled Air.
Humidified or De-humidified Air.
Clean Air.
Circulated Air.
Fresh Air.
Pure Air.
Enough Air.

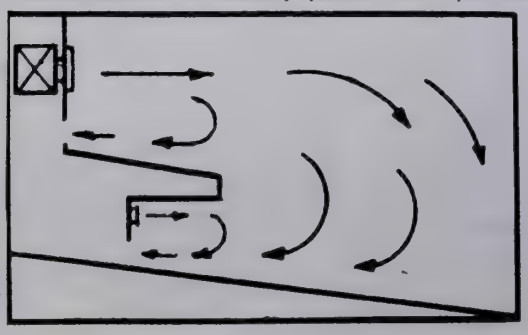
One can easily see the importance of these factors in providing for complete comfort for patrons. Each factor has some bearing on the comfort of patrons which has been proven by years of research conducted by various technical organizations including the National Warm Air Heating and Air Conditioning Association and the American Society of Heating and Ventilating Engineers. Numerous studies were made in large auditoriums and theatres in order to determine the effect of air conditions on people.

It is interesting to note these same seven factors of conditioned air were found to be desirable for comfort through experiments first conducted in research homes. Today, indoor comfort—the science of conditioned air—is not only a phase of modern home living but one for all types of shelters.

Heated and Cooled Air

Heated and cooled air which is air at a satisfactory temperature is probably the best known factor of conditioned air. Applicable to all forms of shelter, it is especially important in buildings where a large group of people are in attendance. There is a feeling of discomfort unless the air within a theatre is at a

AIR DISTRIBUTION METHODS, showing (left) rear-wall and (right) ceiling distribution. These two methods are suitable in distributing conditioned air in theatres. In small- or medium-size theatres, it is sometimes practicable to use side- or front-wall distribution. For satisfactory operation of such a system during the winter, the returns should be preferably located at the floor level and near the front of the theatre to prevent cold spots. Return air ducts may be installed higher, where exits and stages have separate means of heating. (These drawings reprinted by permission from chapter 40, Heating Ventilating Air Conditioning Guide 1946.)



satisfactory temperature, usually that of being too hot or too cold.

The comfort level for temperature varies in different sections of the country. On the average, the comfort level for temperature in theatres is from 68 to 72 degrees. In the North and Middle Atlantic States surveys have shown that theatre patrons are most comfortable at a temperature of about 69 degrees; in the South Atlantic States at 71 degrees; in the Middle West at 70 degrees; and in the Far West and Southwest at 71½ degrees.

The comfort level for homes was found to be a little higher but a theatre temperature for a comfort level should be several degrees lower because of the counter-radiation between the bodies of patrons which are in very close proximity of one another. Therefore, the temperature in the theatre could be adjusted within one or two degrees depending on the number of patrons in the theatre at the time. If the theatre is sparsely occupied the temperature should be raised and if a full-house it should be lowered a little. With the modern indoor comfort systems a change in temperature takes but a few minutes.

By using zone control to regulate the temperature, various temperatures can be maintained in different sections of the theatre. Further studies have shown that the recommended temperature for the seating space and the lounges is from 68 to 72 and for the toilets, and so forth, 68 degrees.

It is very important not to have too wide a variance in temperatures within the theatres at different seasons. It seems advisable that the variance in temperature should not be more than 4 degrees throughout the seasons and care should be taken not to cool the air to too great an extreme during very hot outdoor weather. The abrupt shock which results from patrons stepping from sultry street into too cool an interior or leaving a too cool theatre and feeling a blast of oven-like atmosphere often creates considerable discomfort and causes many theatre patrons to question the efficiency of summer cooling of theatres.

TABLE 1—Winter inside dry-bulb temperatures usually specified. (The most comfortable dry-bulb temperature to be maintained depends on the relative humidity and air motion.) (Reprinted by permission from chapter 14 of Heating Ventilating Air Conditioning Guide 1946.)

Type of Building	Deg F	Type of Building	Deg F
SCHOOLS—		THEATERS—	
Class rooms	70–72	Seating space	68–72
Assembly rooms	68–72	Lounge rooms	68–72
Gymnasiums	55–65	Toilets	68
Toilets and baths	70		
Wardrobe and locker rooms	65–68	HOTELS—	
Kitchens	66	Bedrooms and baths	70
Dining and lunch rooms	65–70	Dining rooms	70
Playrooms	60–65	Kitchens and laundries	66
Natatoriums	75	Ballrooms	65–68
		Toilets and service rooms	68
HOSPITALS—			
Private rooms	70–72	HOMES	70–72
Private rooms (surgical)	70–80	STORES	65–68
Operating rooms	70–95	PUBLIC BUILDINGS	68–72
Wards	68	WARM AIR BATHS	120
Kitchens and laundries	66	STEAM BATHS	110
Toilets	68	FACTORIES AND MACHINE SHOPS	60–65
Bathrooms	70–80	FOUNDRIES AND BOILER SHOPS	50–60
		PAINT SHOPS	80

Inside air temperatures which must be maintained within a building is understood to be the dry-bulb temperature at the breathing line—5 feet above the floor—or the 30-inch line, and not less than 3 feet from the outside walls. Inside air temperatures, usually specified, vary in accordance with the use to which the building is to be put, and this table represents values which conform to good practice.

Humidification

Having air which contains the proper amount of water moisture is our first example where the overhead of operational and maintenance costs of the theatre is reduced as well as the patrons made even more comfortable. Here, there is a decided health factor with regard to air at a proper humidification point.

The improper degree of humidity in the air within the theatre may cause the excessive drying out of mucous membranes which can result in colds, nasal irritations and coughing. We all know that in a large theatre air which is too dry or too moist has a direct bearing on our bodily comfort just as outside air does under the same humidity conditions.

The operational and maintenance cost of the theatre can be greatly reduced by proper humidification. The average theatre is equipped with many expensive furnishings and decorations including draperies, stage curtains, woodwork, upholstery, paintings, etc. Costly depreciation of these objects will take place unless proper humidification and dehumidification of air is maintained.

One of the costly results of improper humidity conditions in the theatre is the drying out of furniture and woodwork which causes shrinkage and pulling apart at the joints. On the other hand, if the air within the theatre is too moist there is a swelling reaction which often results in buckling of expensive panels and furniture.

Sudden changes in the moisture content of the air, from one extreme to the other, may cause lacquered and var-

TABLE 2—Equivalent full load operating hours of refrigeration equipment used for summer cooling, May 15 to October 15. (Reprinted by permission from page 73 of "Modern Air Conditioning, Heating, and Ventilating," by W. H. Carrier, R. E. Cherne, and W. A. Grant. Pitman Publishing Corporation. 1940.)

Application	Hr Open for Business	Atlanta	Boston	Chicago	Detroit	Los Angeles	New Orleans	New York	Philadelphia	Oklahoma City	St Louis	Washington D.C.
Barber shops	1280	1010	650	720	720	680	1080	830	860	1020	890	940
Department Stores	940	840	560	610	610	580	890	700	720	840	750	780
Drug Stores	2100	1630	950	1060	1060	980	1790	1280	1330	1650	1420	1530
Funeral Parlors	600	440	300	330	330	310	470	370	380	440	400	410
Offices	940	870	560	620	620	580	900	710	740	880	770	810
Restaurant (Short Hour)	1290	970	535	620	620	570	1060	760	800	980	830	880
Restaurant (Long Hour)	2100	1510	820	930	930	850	1690	1170	1210	1530	1300	1400
Specialty Shops (5 & 10)	1090	800	530	590	590	560	860	670	690	810	720	750
Theaters—Continuous	1500	1010	700	750	750	720	1080	850	870	1020	910	950
Theaters—Neighborhood	900	640	420	450	450	430	650	500	520	650	550	580

TABLE 3—Approximate costs of all-year air conditioning. (Reprinted by permission from page 64 of "Modern Air Conditioning Heating, and Ventilating," by W. H. Carrier, R. E. Cherne, and W. A. Grant. Pitman Publishing Corporation. 1940.

Application	Selling Price per Unit Indicated											
	Sq Ft Net Area			Person			Ton Refrigeration			CFM Supply Air		
	Low	Avg	High	Low	Avg	High	Low	Avg	High	Low	Avg	High
Banks	$1.25	$2.00	$3.50	$80	$140	$320	$350	$480	$700	$0.95	$1.40	$2.75
Department Stores — Basement	0.60	1.00	1.15	25	40	100	250	325	400	0.60	0.80	1.00
Department Stores — Main Floor	0.60	1.05	1.25	25	40	80	250	325	400	0.60	0.75	0.90
Department Stores — Upper Floors	0.60	0.90	1.10	30	45	100	300	350	400	0.60	0.80	1.00
Hotels—Guest Rooms				$240[c]	$300[c]	$420[c]						
Office Buildings	$0.85	$1.25	$2.00	110	135	180	$300	$375	$500	$0.75	$1.05	$1.50
Offices—Small Suites	1.00	1.75	3.25	110	180	350	300	450	800	0.75	1.25	2.50
Restaurants	1.40	2.20	3.50	15	18	25	215	280	400			
Specialty Shops — Barber Shops and Beauty Parlors	$1.50	$2.50	$4.00	$50	$100	$150	$325	$400	$500	$0.70	$1.00	$1.50
Specialty Shops — Dress Shops	1.25	1.50	2.00	45	55	75	230	275	350			
Specialty Shops — Drug Stores	1.25	1.50	2.00	45	55	75	240	275	325			
Specialty Shops — Five-and-Ten	0.90	1.20	2.80	22	33	55	220	270	425	0.80	0.95	1.50
Specialty Shops — Shoe Stores	0.95	1.20	1.75	35	40	50	230	275	350			
Theaters				$9[d]	$15[d]	$23[d]	$215	$300	$450	$0.65	$1.00	$1.25

c. Price per room.

d. Price per seat.

There is a wide variation in unit prices such as shown above, due to differences in load concentration and in complexity of physical layout. Prices cover air-conditioning work only, for year-'round use (except in the "low" column, which in general include summer cooling only).

Net area (square feet) includes corridors, but excludes elevators and service spaces.

Excluded are the cost of plumbing and steam connections, electrical wiring, painting and redecorating, building construction and alterations, and boiler or burners.

Low figures in general are simply direct expansion systems using city water for condensing.

High figures are usually chilled water systems with cooling towers or evaporative condensers, and may be considered high quality systems as well.

nished woodwork to blister and peel as well as causing rugs, upholstery, curtains and other fabrics to deteriorate. Dry air in the winter absorbs moisture from fabric material causing it to become brittle and more liable to wear. In the summer when the moisture content of the air is naturally high the resulting dampness is responsible for mildew in fabrics.

Proper humidification will help prevent wallpaper from peeling and plaster cracks caused by excessive dryness can be avoided.

In experiments conducted to determine the correct amount of moisture in the air needed to preserve wood furnishings the United States Forest Products Laboratory found that a relative humidity of about 40 per cent is desired. This figure also represents a humidification point which is more generally accepted as healthful for personal indoor comfort for theatre patrons the year round.

Clean Air

Keeping the air inside the theatre clean at all times is another factor in complete comfort conditions for the patron and his family. It must be remembered that the patron spends on the average of two hours inside the theatre, time enough to breathe into his lungs and respiratory tract considerable amounts of dirt, dust and pollen which can pave the way to respiratory diseases such as colds, asthma and hay fever.

It has been proven that devices designed to clean the air within the theatre and other shelters will remove the majority of these harmful particles. For example, tests show that from 98 to 99 per cent of the ragweed pollen, one of the smallest dust particles, can be removed from the air by devices which can be attached to a basic indoor comfort system.

Maintaining clean air conditions in the theatre also represents a tremendous savings to the management in cleaning bills and preservation of furnishings. The amount of dirt which can enter a theatre because of the lack of air cleaning devices is staggering. In the city of New York, a study showed that over 48 tons of soot fall every month to the square mile of residential areas. Accordingly, more soot falls in downtown areas.

With clean air conditions in the theatre, walls, woodwork and fabrics which usually need a scrubbing or cleaning every year can go two to three years or more without cleaning.

Correct Air Circulation

In the factor of circulated air the theatre management has a definite public opinion to overcome. We have already mentioned the huge theatres which patrons often referred to as "drafty old barns." The trick in providing circulated air lies in the fact that it should be kept moving constantly but imperceptibly.

Air movement is important for two reasons. First, it increases heat loss of the human body by convection or evaporation which is a great boon to indoor comfort in a crowded theatre. The result is accomplished through the removal of hot humid air from near the body surface and replacing it with relatively cooler and drier air.

Secondly, in order that the patrons be continuously surrounded by the other factors of conditioned air it is necessary that the air within a theatre be circulated.

Many theatres which are equipped with devices designed to provide for air circulation have failed to use them because of the noise of the electric motors and the vibrations which interfere with the patron's hearing. This can be remedied in the following manner:

(1) Fans should be kept at low velocities which will prevent noise in duct work.

(2) Fans should be mounted on resilient bases to absorb noise and vibration which in turn may be transmitted to floor and ducts, and thence to building structure.

(3) All ducts to fans should be acoustically treated on the interior and in special cases should be provided with sound traps or filters.

Fresh Air

Closely allied with the circulating of conditioned air within the theatre is the providing of fresh air to add to the comfort of the theatre patron. Because of its crowded conditions the staleness of air within a theatre often is acute and therefore it is necessary that the air should be refreshing at all times and free from noxious elements.

By circulating outside air through the seating space proportionate to the number of cubic feet of air per person the common odors which result from crowded conditions will be reduced below the threshold of the patrons' senses. Listed below are the minimum fresh air requirements for large shelters including theatres.

Net air space per person (cubic foot)	Outdoor air supply (cubic foot per minute per person)
100	25
150	20
220	15
355	10

By using this table the amount of outside air admitted to the seating space will be governed by the attendance in the theatre at any one time.

Pure Air

Research in large medical institutions has shown that the air inside any form of shelter should be pure. This applies specifically to public shelters such as theatres, where impure air is always a constant threat of infection.

Many of the germs and bacteria which will be injected into the air within a theatre can be eliminated through filtration upon the air re-circulation cycle. However, there are still many minute germs which escape all present filters. At the present time there are experiments being conducted which it is hoped will lead to the perfection of certain devices designed to remove almost 100 per cent of the germs from the air within a theatre and other shelters. Among them is the germicidal lamp which was used so successfully in hospitals during the war.

Enough Air

The remaining factor of conditioned air which is air of adequate density is not to be confused with any of the other factors of conditioned air mentioned in this article, especially with regard to fresh and circulated air. At the present time this factor is not too important to theatre patrons. However, the day may come when it will be as necessary to provide air of adequate density or enough air, as is done in present-day stratosphere airplanes and submarines. Study has proved that the pathological functions of our bodies are not unlike functions of a combustion engine which requires so much air in order to operate. Without an adequate amount of air, our body functions slow down, causing fatigue both mentally and physically.

CONTROL OF AIR CONDITIONS

In discussing the seven factors of conditioned air we have assumed that they are all properly controlled. The best theatre air conditioning system would be worthless unless it was properly controlled. According to engineers, long experienced in the field, the best method of control is through the use of zone controls. In this way the air conditions in the seating space, the lobby, toilets, lounges, and so forth, can be controlled independently of one another.

An example of the value of zone controls can be seen in theatres which permit smoking in the balcony. By increasing the air circulation in the balcony only, the excess smoke which often disturbs not only in the balcony but on the main floor, can be removed easily.

It has been the purpose of this article to point out the value of "patron comfort" through proper air conditions as a factor in the increasing of business volume. We have discussed the seven factors of the conditioned air which provide the ultimate in indoor comfort conditions. Today, the American public is indoor comfort conscious. Not only in their homes, but in their schools, offices and in their theatres they desire air conditions which will not only afford them the best in comfort but also improved health conditions.

In planning for the installation of an indoor comfort system which will afford air which is heated or cooled, humidified or de-humidified, clear, circulated, fresh, pure and of adequate density, whether for new construction or for modernization, the theatre management should call in a qualified warm air heating and air conditioning engineer. With his advice a system can be selected depending on the following factors:

(1) Comparative effectiveness.
(2) Characteristics and requirements of the load.
(3) Space requirements.
(4) Initial cost.
(5) Operating costs and maintenance.

There is another important factor in the selection of an indoor comfort system which is so often heeded. The system should be flexible enough to allow the addition of new devices as they are developed through scientific research. Certainly one of the biggest research programs in the nation today embraces the field of air conditioning. If new and improved equipment which appears on the market can be merely added to the present theatre system it will represent a large economic saving.

After selection of a system care should be taken that a reliable contractor who is experienced in theatre installations is contracted to install the system.

Upon completion of the installation correct optional procedure of the system should be learned by the theatre management and personnel in order to obtain the best results. Many theatres which have adequate systems have failed to offer their patrons comfortable and healthy air conditions because of lack of knowledge in correct operation, adjustment and maintenance. By trial and use is a good method at which to arrive at a satisfactory operation point.

A theatre which offers complete air conditions has something to sell. As top flight films are heralded by theatres in advertising and in publicity so should the fact of satisfactory and healthy air conditions be merchandised. Add such terms as "Filtered Air" and "Fresh Air" to marquees, as well as the term "Cool Air," and previous attendance records will fall by the wayside.

The progressive theatre managements today give their patrons the best in film entertainment and the best in comfort.

TABLE 4—Recommended and maximum duct velocities, given in feet per minute. (Reprinted by permission from chapter 41 of Heating Ventilating Air Conditioning Guide 1946.)

Designation	Recommended Velocities, fpm			Maximum Velocities, fpm		
	Residences	Schools, Theaters, Public Buildings	Industrial Buildings	Residences	Schools, Theaters, Public Buildings	Industrial Buildings
Outside Air Intakes[a]	700	800	1000	800	900	1200
Filters[a]	250	300	350	300	350	350
Heating Coils[a]	450	500	600	500	600	700
Air Washers	500	500	500	500	500	500
Suction Connections	700	800	1000	900	1000	1400
Fan Outlets	1000–1600	1300–2000	1600–2400	1700	1500–2200	1700–2800
Main Ducts	700–900	1000–1300	1200–1800	800–1000	1100–1400	1300–2000
Branch Ducts	600	600–900	800–1000	700	800–1000	1000–1200
Branch Risers	500	600–700	800	650	800–900	1000

Reverse Cycle Units for Air Conditioning

For the Future, the Marvair Will Permit Heating—and Cooling—with Cold Water

FOREWORD

Nearly a century has passed since England's late, great physicist, William Thompson Kelvin (1824-1907), first suggested that it should be possible to reverse the operation of a mechanical refrigerating unit, so that, instead of essentially pumping cold into a space, it would pump heat out of it.

On the principles suggested by Lord Kelvin, apparatus for heating by reverse cycle refrigeration has come into being. In this type of heating, energy is absorbed in an evaporator from some available source of heat, pumped into a higher temperature, and delivered to a condenser, from which the heat is used for heating purposes. The condenser acts as a heat pump whose fundamental function is to raise the potential of the heat.

Late last summer the Electric Power Board of Chattanooga (Tennessee) revealed the installation of equipment, based on the principles of reverse cycle heating and cooling, to provide on an experimental basis for homes a heating system whose energy would stem from a 200-foot deep well. Equipment for the installation was manufactured by the Muncie Gear Works under the trade name Marvair.

At the present time, according to C. B. Osborne, of the Power Board, Marvair is made in two sizes: a 3-hp. unit, suitable for heating and cooling a space of approximately 60,000 Btu. heat loss, and a 5-hp. unit, suitable for heating and cooling a space of approximately 100,000 Btu. heat loss. "These units, of course," says Osborne, "would not be adequate singly for a theatre application, but I believe the manufacturer intends to build larger units at a later date which might be applicable to theatre jobs. We visualize in the not too distant future the utilization of the Tennessee River, which bisects Chattanooga, as a source of heat for commercial buildings."

For a more complete discussion of the Marvair system, these pages are now turned over to the Muncie Gear Works, whose material is presented here through the cooperation of M. M. Smith, the company's vice-president.

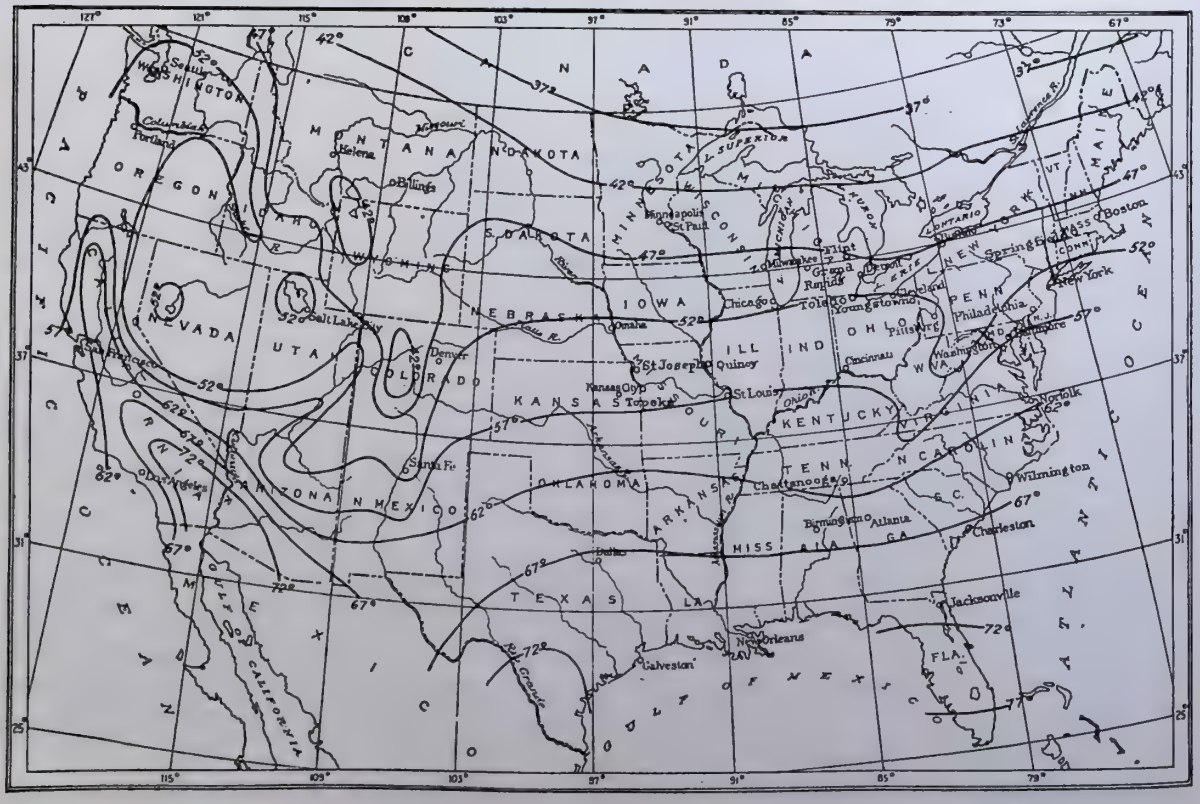
WHAT IS MARVAIR?

Marvair is an electrically powered, automatic, air-conditioning plant giving year 'round comfort in one compact unit to homes, offices, or small commercial buildings. It produces heat, or cool air, as needed and circulates it through a conventional forced-air duct system. A unit can be installed in basement, utility room, or even in a closet, and the comfort which it creates is carried through air ducts to all areas of a structure.

Production of Marvair automatic heating and cooling is quiet, safe, and dependable. The change over to cooling or heating is accomplished by means of automatic controls and requires no manual attention.

Marvair is the ideal type of heating. It achieves the ideal in automatic operation, cleanliness, neatness, compactness, flexibility, and quick response to changes in heating requirements. Heating systems utilizing flame combustion to gen-

FIGURE 1—Approximate temperature of water from non-thermal wells at depths of 30 to 60 feet. For wells of greater depth, add 1 degree for every 64 feet. Water temperatures reflect the earth temperatures, which will be similar. The Marvair experience has indicated that 200 feet of submerged pipe—that is, 200 feet of pipe below the operating water level in the well—gives satisfactory operation, subject to local conditions. The principal advantage of a closed system as a source of heat is that it can be used in contiguous urban developments. Since no water is pumped from the ground, there is no effect on the water level and no waste or spill.



erate heat introduce many problems, including the hazard of explosion and the most serious of all home hazards—fire, particularly serious in rural areas because of the lack of adequate fire-fighting equipment. For heating in rural homes, Marvair opens up a field of automatic heating in which it has no competition.

WHAT DOES IT DO?

Marvair heats and cools, provides moisture control, filters, and, finally, provides, through suitable duct systems, air movement so necessary for living comfort.

This electric heating plant delivers heat without combustion. Since there is no combustion, there are no products of combustion, such as dust, soot, smoke, and ashes. There is no risk of explosion, fire, or asphyxiation from Marvair. These faults of conventional heating plants are eliminated.

In order to accomplish all this, Marvair takes heat from the earth in winter and puts it in the home; in the summer, it takes heat out of the home and puts it in the earth.

HOW DOES IT WORK?

Marvair is a device for pumping thermal energy or heat from one temperature level to a higher temperature level. It delivers large amounts of thermal energy at moderate temperatures by the expending of a smaller amount of electrical energy. It is, basically, nothing more than the ordinary household refrigerator unit.

Marvair utilizes the earth as the source of heat because in the earth there is available everywhere large quantities of heat at temperatures which permit efficient operation. In order to see how Marvair makes use of this earth heat, let us consider how a heat unit gets from the earth to the air in a room.

A heat unit stored in the earth comes in contact with a cold pipe extending into the earth and is absorbed by the water in this pipe. The water, in being pumped up the pipe, carries the heat unit to the water radiator of Marvair, where the heat unit again comes in contact with a colder fluid, the refrigerant in Marvair. As before, the heat unit naturally goes to the cooler region and is absorbed by the refrigerant gas. This gas is carried to a compressor where the pressure of the gas is increased, and, as in all adiabatic compressors, the temperature also increases. This higher temperature and pressure gas is discharged from the compressor and moves to the air radiator over which cool air flows. Again the heat unit seeks out the cooler region. This region is the air stream on its return path to the room. The heat unit is transported in this stream to the room to be heated, thus performing its function.

It will be noticed that in this process there are three independent circuits. The first is that of the water system used to absorb heat from the ground. The second is the refrigeration circuit which transfers heat to the air stream and to a higher temperature level. The third circuit is that of the air stream which transports the heat to or from the space to be conditioned. Each of these will now be considered separably and in detail.

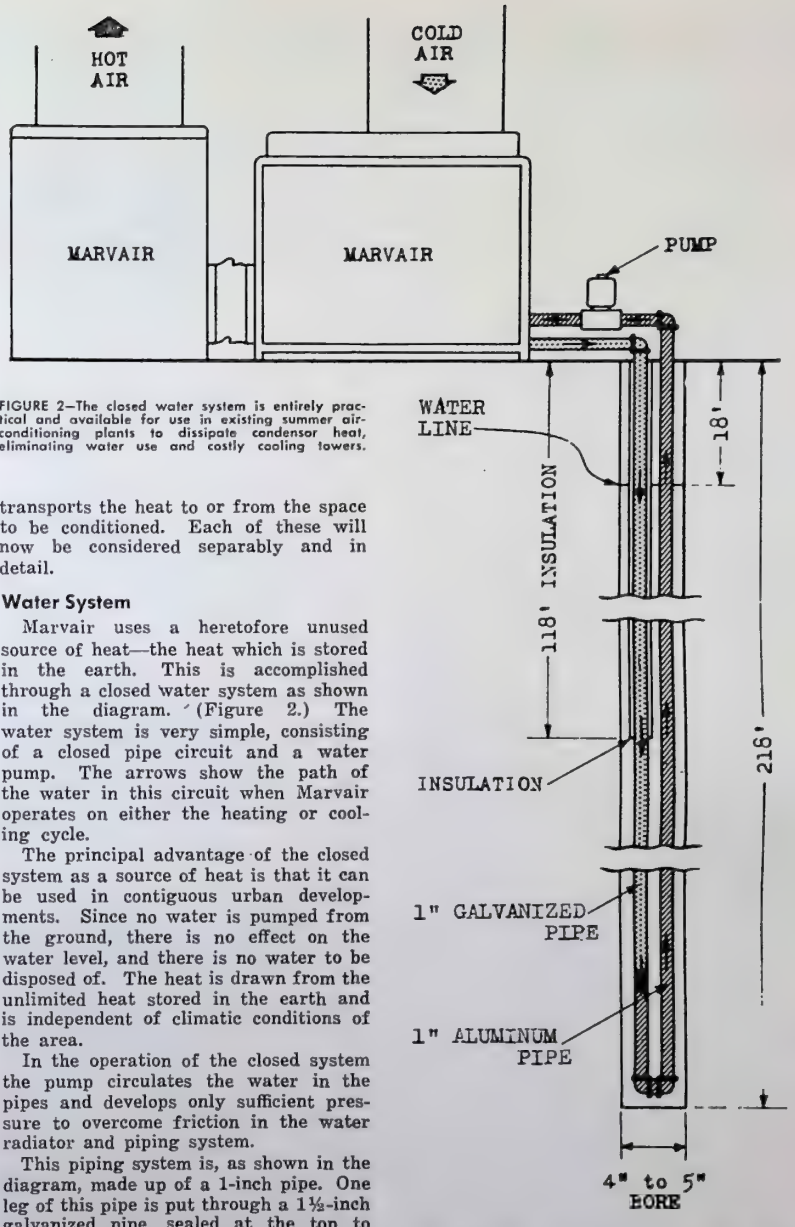


FIGURE 2—The closed water system is entirely practical and available for use in existing summer air-conditioning plants to dissipate condensor heat, eliminating water use and costly cooling towers.

Water System

Marvair uses a heretofore unused source of heat—the heat which is stored in the earth. This is accomplished through a closed water system as shown in the diagram. (Figure 2.) The water system is very simple, consisting of a closed pipe circuit and a water pump. The arrows show the path of the water in this circuit when Marvair operates on either the heating or cooling cycle.

The principal advantage of the closed system as a source of heat is that it can be used in contiguous urban developments. Since no water is pumped from the ground, there is no effect on the water level, and there is no water to be disposed of. The heat is drawn from the unlimited heat stored in the earth and is independent of climatic conditions of the area.

In the operation of the closed system the pump circulates the water in the pipes and develops only sufficient pressure to overcome friction in the water radiator and piping system.

This piping system is, as shown in the diagram, made up of a 1-inch pipe. One leg of this pipe is put through a 1½-inch galvanized pipe, sealed at the top to provide dead air space, in order to insulate it from the inside pipe. The return pipe is made of aluminum which has better heat transfer characteristics. As in all systems of this type there are many possible variations which can be utilized to obtain different performance characteristics. Those outlined in this actual installation were chosen as a result of experience. Experience indicates that 200 feet of submerged pipe, that is, 200 feet of pipe below the operating water level in the well, gives satisfactory operation, subject to local conditions.

The map (Figure 1), taken from a publication of the United States Geological Survey, shows approximate water temperature at 30 to 60 feet in all parts of the country. For wells of greater depth add one degree for every 64 feet. Water temperatures reflect the earth temperatures, which will be similar.

Refrigeration Circuit

Fundamentally, the Marvair refrigeration circuit consists of only four elements as indicated in the accompanying diagram—a compressor, an air radiator, an expansion valve, and a water radiator.

The basic circuit of operation on the heating cycle is indicated in the accompanying diagram. (Figure 3.) In this case, the compressor pulls low pressure gas from the water radiator, raises the pressure and temperature of the gas, and passes it on to the air radiator. Here the heat is given up to the air as it passes over the radiator. In giving up this heat, the refrigerant vapor is condensed to a

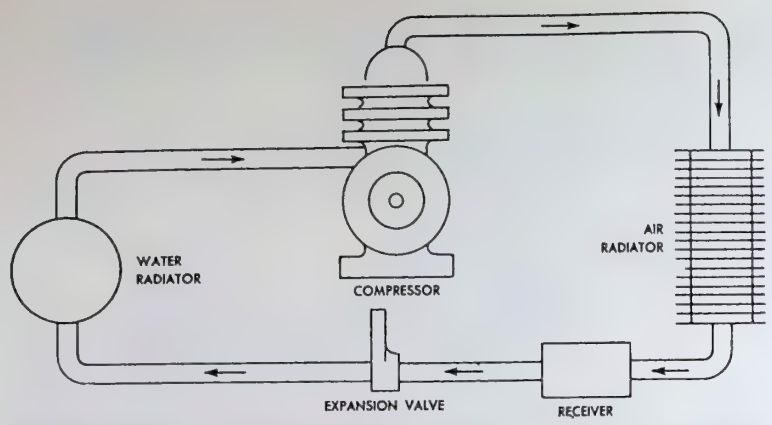


FIGURE 3—Fundamentally, the Marvair refrigeration circuit consists of only four elements, as here indicated—a compressor, an air radiator, an expansion valve, and a water radiator. As will be seen in Figures 4 and 5, the compressor works with both the heating and the cooling cycles. The shift from one cycle to the other is accomplished automatically through the operation of four solenoid valves, requiring only the very minimum of controls.

liquid and passes back to a receiver or storage tank. As heat is required this high pressure liquid is passed through an expansion valve into the water radiator where it is vaporized. In so doing it picks up new heat from the water and continues its path around the refrigerant circuit. (Figure 4.)

When cooling is required the path of the refrigerant is reversed and the hot refrigerant vapor is passed to the water radiator and the air radiator is used to vaporize the refrigerant gas. (Figure 5.)

These discussions tell briefly how the unit heats and cools. Marvair utilizes the same basic equipment in both heating and cooling. The change is accomplished very simply by the automatic operation of four solenoid valves which require a minimum of controls. The piping diagram showing the path of the refrigerant for the heating and cooling cycles is shown schematically in detail in the accompanying diagrams.

Air System

Marvair utilizes the conventional air-duct system to transport the air to and from the space to be conditioned. An efficient, motor-driven fan used in connection with the compressor unit provides an economical and quiet means of transporting air to and from rooms. When the unit operates on the heating cycle the air to be conditioned flows over the air radiator where its temperature is increased. This continues until comfort is attained.

When the room temperature exceeds that necessary for comfort this is registered on the automatic control and the unit converts to the cooling cycle. When Marvair is operating on the cooling cycle, the air is cooled as it passes over the coils. At the same time the air is cooled, moisture is condensed out if the humidity is too high, further contributing to living comfort. Marvair provides, in addition to heating, cooling, and moisture control, proper filtering to reduce dust and dirt brought into the house from the outside.

Controls

Marvair is equipped with a fully automatic year 'round control. The single control unit, after once being set, will maintain home or office temperature within prescribed comfort zones regardless of outside atmospheric variations. Marvair will cool, heat, or simply circulate air to maintain this comfort region despite atmospheric changes and requires absolutely no attention.

Atmospheric changes do not have to be anticipated. Temperature fluctuations are minimized. Stratification of air between ceiling and floor is eliminated. Fully automatic operation provides for the first time real year 'round comfort in home and office.

CONSTRUCTION

The keynote in design of Marvair has been simplicity. In order to obtain long life from any type of equipment, it is necessary that only proven equipment be used, that this equipment be as simple as possible, and that accessories and "gadgets" be kept to a minimum. Marvair has succeeded in meeting all these requirements. In addition, a substantial rigid housing protects the equipment during transportation and installation and during its long life. Baked enamel finish assures protection against scratches and marking and blends harmoniously with surroundings. Particular attention has been given to the elimination of noise and vibration.

Compressor Specifications

The compressor is a four-cylinder V-type, 1¾-in. bore by 1¾-in. stroke, with cylinders cast in pairs mounted at 90-degree angles. Pistons are timed to give one compression stroke to 90 degrees of revolution. Blocks are cased so that suction gas will enter a chamber between the cylinders. Here oil is separated and returned to case through a check valve; the gas passes up to a cased valve plate on top of the cylinder block. This results in smooth, non-pulsating flow of refrigerant and exceptionally quiet operation.

TABLE I—Specifications for 3- and 5-hp. compressors for Marvair systems.

	3-hp.	5-hp.
Revolution a min.	1,060	1,265
Cubic feet a min.	10.3	18.2
Piston, feet a min.	309	369
Suction line	1⅛ in. o.d.	1⅛ in. o.d.
Liquid line	½ in. o.d.	⅝ in. o.d.
Refrigerant	Freon-12	Freon-12

Materials which will insure long and trouble-free life are used in the compressor. Close-grained semi-steel is used for the body, pistons, valve plates, and head. Eccentric traps are of tough malleable, lined with steel-backed copper-face bearings running on hardened, drop-forged eccentrics. The eccentric shaft is hardened steel in copper-lead bushings. The extra large valves are of Swedish steel, die cut and lapped dead flat. The seal is hardened steel running on high-lead bronze.

Close tolerances are maintained throughout the compressor. Bearing surfaces of shafts and eccentrics are "super finished" to absolute mirror smoothness. Seal parts are hand-lapped to optically flat limits. Five separate cleaning operations insure freedom from metal chips or other foreign matter. All parts are definitely held to interchangeable limits.

Positive lubrication is obtained with a rotary pump located on the end of the crankshaft. Oil under pressure is forced to all shaft bearings, to eccentric bearings, and into the seal bellows through drilled holes in the shaft and eccentrics. Cylinders and pins are oiled by a spray from the eccentrics.

A dual pressurestat with adjustment visible through unbreakable window is provided.

Blower Assemblies

The overall size of Marvair has been reduced by the use of a new improved blower assembly considerably smaller than normal in size. Laboratory and wind tunnel tests for performance and long life prove this a superior assembly.

Many revolutionary features are included in this unit. The off-set in scroll sides reinforce the inlet of the Venturi for greater strength. Its three-point bearing bracket suspension methods offers less interference with air flow. A long life, frictionless, self-aligning bearing completely encased in Neoprene is employed. The housing base is of heavy gauge, cold reduced steel, cross braced and offering minimum air restriction. The scroll of heavy gauge, cold reduced steel is scientifically dimensioned to match perfectly a vastly improved blower wheel. The blower wheel has center suspension. Motor mounting is one piece with automatic belt tensioning facilities.

Motor Specifications

All motors are particularly designed and suited for their individual applications. They are of the capacitor-start, induction-run type and have a compact, long-lived capacitor mounted on the frame. Mechanical design insures triple protection against physical damage, electrical damage, and operating wear and tear. Electrical design provides high starting torques of approximately 300

per cent for compressor motor. Medium per cent are used for air blower motor starting torques of approximately 185 and water pump motor to prevent belt slippage, noise or vibration if brought up to speed too quickly.

Because of the cast rotor and absence of brushes or commutator the following advantages are realized: (1) Dependability inherent with the simplicity of the capacitor design; (2) quiet operation, and (3) freedom from radio interference.

For additional design simplicity, all motors employ 230-volt, 60-cycle and single- or three-phase current.

Water System Specifications

Marvair employs a closed, circulating water system using the earth as the source of heat. The water system consists of a centrifugal pump and a submerged heat exchanger. The well into which the submerged heat exchanger is run should have a minimum finished bore of 4 or 5 inches and an average depth of 200 feet (depending upon locality) below the natural water level.

The submerged heat exchanger in this well is a vertical "U" tube pipe run to at least 200 feet below the water surface. One-inch pipe is normally used for this submerged heat exchanger. Smaller sizes should not be used, and larger pipe can be used if the well bore permits. Larger pipe reduces the power requirements for water circulation.

Water is circulated through the system by a horizontal, centrifugal pump designed to provide smooth, quiet, vibrationless operation. The pump case, diffuser plate, and brass impeller are accurately machined and balanced. The rotary seal, removable without tools, requires no adjustment and prevents overloading of motor. The pump shaft is short for accurate alignment. The motor is of capacitor ballbearing type with overload protection.

TABLE II — Characteristics of the blower assembly with top horizontal discharge for Marvair systems, for ¼- and ½-hp. motors.

	¼-hp. Motor	½-hp. Motor
Revolutions a minute		
Minimum	545	474
Maximum	752	654
Pulley		
Motor	3½ in	3⅝ in.
Blower	7 in.	8 in.
Belt number	42	46

Although a minimum of maintenance is required, the unit is readily disassembled for inspection or servicing. All internal parts may be removed as a complete unit, without disturbing suction or discharge piping, simply by removing tap bolts.

Heat Exchangers

Air and water radiators have been designed on basic principles of heat transfer with particular attention to providing types of construction which will give continued service under design conditions over life of the equipment. Compact design of both air and water radiator contributes to the compactness of the entire unit. Balance between surface and air velocity is maintained on the air radiator to insure efficient operation and to provide satisfactory humidity control when operating on the cooling cycle. The air radiator utilizes a tube system fourteen rows wide and six rows deep with seven fins per inch of secondary surface.

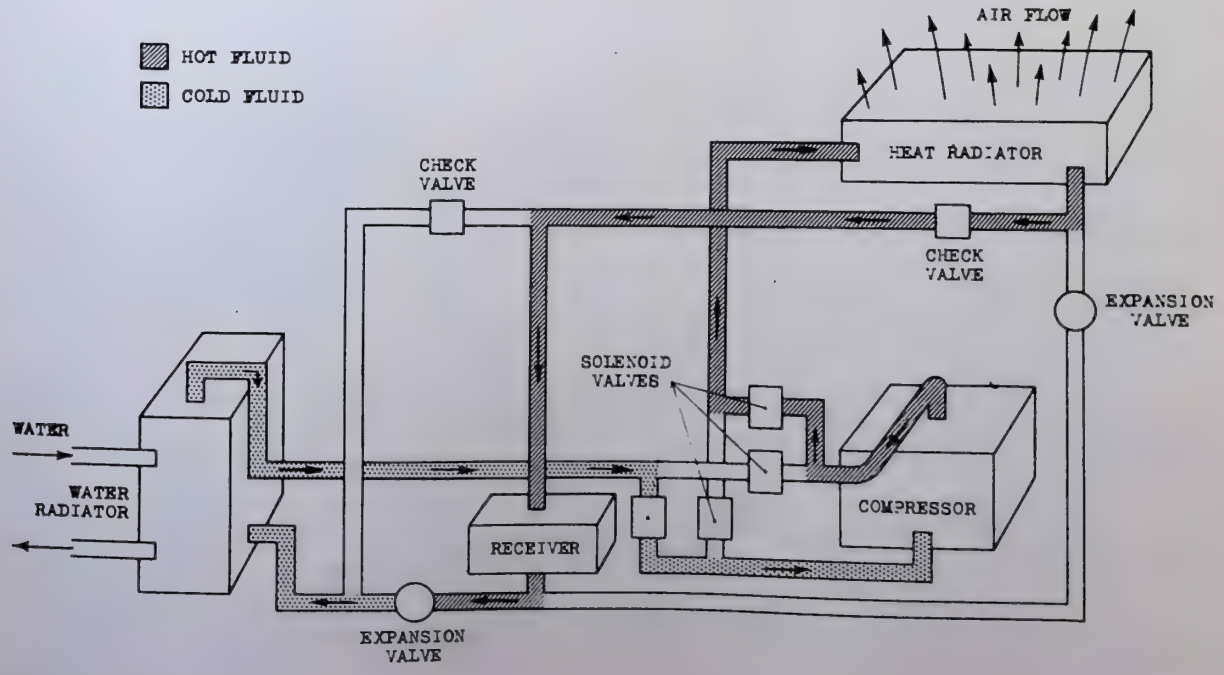
The water radiator is designed for low water pressure drop to keep water pump size down and to give long service. The design provides proper oil return and keeps the pressure drop in the gas side to a practical minimum. To accomplish this a dry systetm has been utilized. Typical performance data on the water radiator when operating on the heating cycle is as follows:

Water temperature in (degrees)	50	60
Water temperature out (degrees)	41	49.8
Btu rate an hour.....	37,100	42,200
Suction pressure (lbs.).	29.90	37.6
Suction temp. (deg.)..	33.2	48.9
Temperature of liquid to expansion valve (degrees)	66.4	75.7
Flow in gallons an hour	495	500

Temperature Control

Marvair comfort is maintained by means of a temperature controller utilizing a balancing motor and mercury auxiliary switches. The temperature controller consists of a vapor filled bulb which actuates the instrument bellows, which, in turn, actuates the potentiometer arm. To set the controller it is only necessary to set the indicator to the

FIGURE 4—The basic of operation on the heating cycle is here indicated. In this case, the compressor pulls low pressure gas from the water radiator(raises the pressure and temperature of the gas, and passed it on to the air radiator. Here the heat is given up to the air as it passes over the radiator. In giving up this heat, the refrigerant vapor is condensed to a liquid and passes back to a receiver or storage tank. As heat is required, this high pressure liquid is passed through an expansion valve into the water radiator where it is vaporized. In so doing it picks up new heat from the water and continues around the refrigerant circuit.



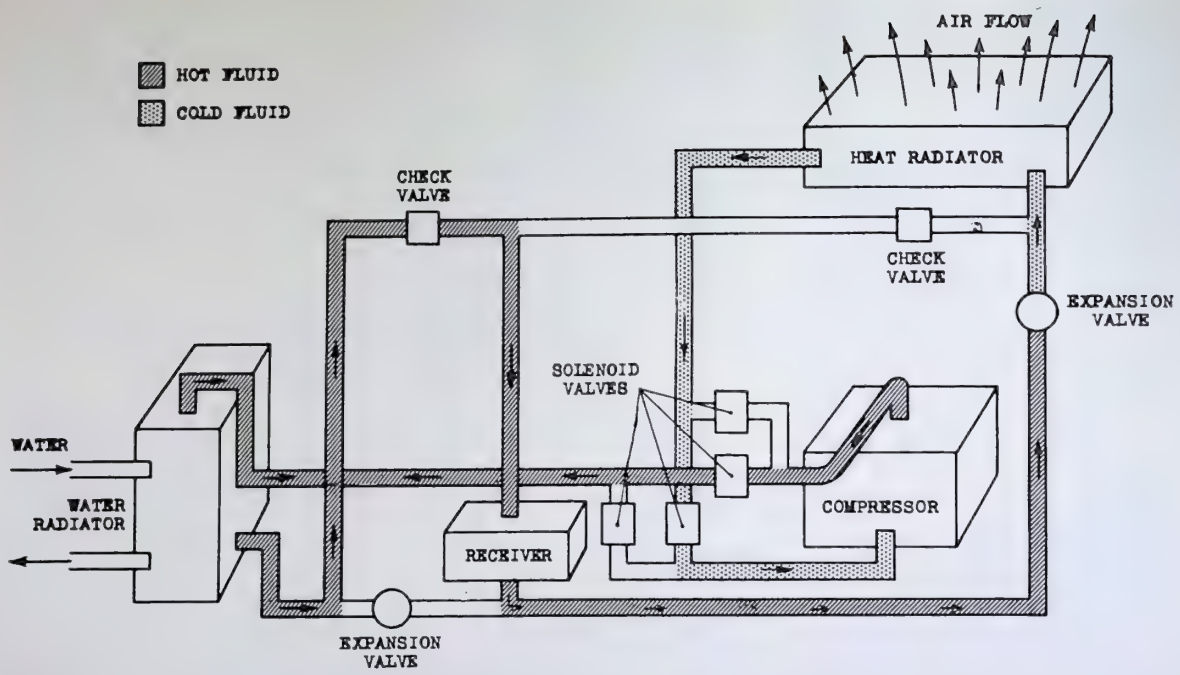


FIGURE 5—When cooling is required, the path of the refrigerant is reversed and the hot refrigerant vapor is passed to the water radiator and the air radiator is used to vaporize the refrigerant gas. Figures 4 and 5 tell briefly how the unit heats and cools. Marvair utilizes the same basic equipment in both heating and cooling. This change is accomplished very simply by the automatic operation of four solenoid valves which require a minimum of controls. The piping diagram shows the path of the hot fluid (cross hatching) and the cold fluid (dotted areas) for the heating cycle shown in Figure 4 and the cooling cycle seen in Figure 5.

temperature to be maintained. The controller is factory calibrated and requires no further adjustment. The change in potentiometer arm setting causes a proportional change in the balancing motor. The mercury auxiliary switches are mounted on each end of the motor shaft and are thus operated in accordance with temperature variations. The unit is completely housed to eliminate accidental damage.

The balancing motor is of new design, with all moving parts of the gear train as well as capacitor power unit immersed in oil. Periodic lubrication is not necessary. As the motor load is light and always consistent there is no danger of overload.

Limit switches within the motor assembly prevent any possibility of excessive motor arm rotation; that is, past the prescribed 160 degrees. As there is no mechanical linkage to motor shaft, there is no danger of motor damage. These conditions, plus the fact that the unit is completely cased, result in a neat, compact, trouble-free unit.

As Marvair may operate for many months before climatic conditions call for a reversal of cycle, it is deemed advisable to employ mercury auxiliary switches. Mercury switches are positive in action even after long inactive periods as they are glass-sealed, making them dust-free, dirt-free and corrosion-free. Contact wear is negligible with mercury make and break. The complete temperature control unit is composed of standardized, interchangeable parts.

TABLE III—Pump-motor specifications for the 3- and 5-hp. Marvair systems.

	3-hp.	5-hp.
Motor horsepower	¼	⅓
Pump capacity, gal. an hr.	600	1,000
Pressure	30 lbs.	40 lbs.

Solenoid Valves

Four solenoid valves, operating in pairs, perform the task of refrigerant reversal. Normally one pair is open with the other pair closed. To prevent excessive starting load, to avoid valve chatter, and to insure valve seating, a definite operating sequence is followed in reversing refrigerant flow. The following time sequence is observed: (1) Compressor stops, (2) second pair of valves opens, allowing all line pressures to equalize, (3) first pair of valves closes, allowing seating period, and (4) compressor starts under lighter load and with valves properly seated.

All solenoid valves are heavy-duty, large-capacity, providing abundant power for extreme operating conditions, positive in action and giving a low drop. To simplify electrical wiring and control, 220-volt, 60-cycle coils are used.

APPLICATION OF MARVAIR

The introduction of a new device such as Marvair always introduces application problems because of radical departure from current practices. Under such circumstances either of two methods of application can be used. The first is to make the necessary correction in standard methods of calculating heating load and use actual performance data. The other is to continue to use the established and accepted practices of figuring heating loads and to revise capacity figures to fit these methods.

Because of the well established methods developed for combustion heating equipment, it has been felt desirable to follow the latter course in working up information which can be used in connection with application of Marvair. Accordingly the Btu capacity figures as given in the tables showing performance and other information on Marvair are directly applicable to loads as calculated by American Society of Heating and Ventilating Engineers methods. These capacity figures for Marvair are based on actual operation and experience with the unit. (Figure 6.)

The following procedure should be followed in picking out the proper size of Marvair needed: (1) Calculate the heat load by American Society of Heating and Ventilating Engineers formulas, and (2) select the proper size of Marvair from Table V.

In order to assist in the making of estimates on the power necessary to provide heat for a normal heating season the chart (Figure 6) has been prepared. All the information which is

TABLE IV—Characteristics of motors for the Marvair system.

Timing	2 minutes
Stroke	160 degrees
Maximum load to extreme radius	40
Maximum, continuous load.	108 inch

TABLE V—Specifications for two Marvair systems. (Subject to change.)

	3-hp. System	5-hp. System
Width	28 inches	28 inches
Length	40 inches	40 inches
Height	34 inches	34 inches
Weight	845 pounds	1,075 pounds
Heating capacity, with 50° water.	50,000 Btu.	100,000 Btu.
Cooling capacity, with 75° water.	32,000 Btu.	54,000 Btu.

needed to make this estimate is the degree days, which are readily available for most areas, and the heat loss for the building as calculated from American Society of Heating and Ventilating Engineers formulas. As an illustration, consider a home for which the degree days are 3,500 and the calculated heat loss of 50,000 Btu. Enter the chart at the right hand side at 3,500 degree days, travel across to the line marked 50,000 Btu and then down as indicated by the dotted line and read an estimated 3,900 KW hours needed for the heating season.

SUMMARY

Marvair is, unquestionably, a summer and winter heating and air conditioning miracle, made practical, as the technical information in the foregoing pages testifies. Brought to bear upon the unit's development during the past several years has been the talent, training and knowledge of an entire group of engineers and heat exchange experts.

The theory of Marvair has been tested in practice. The building of the unit itself has been a thorough job, employing the finest technical engineering skill.

All this labor has made possible perfect living comfort for the home in June or January—the year 'round—and with no need for attention and care for the intallation responsible! American homes are definitely in the market for such a product.

The phrase "no need for attention and care" embraces a score of subjects long the bane of every householder's existence.

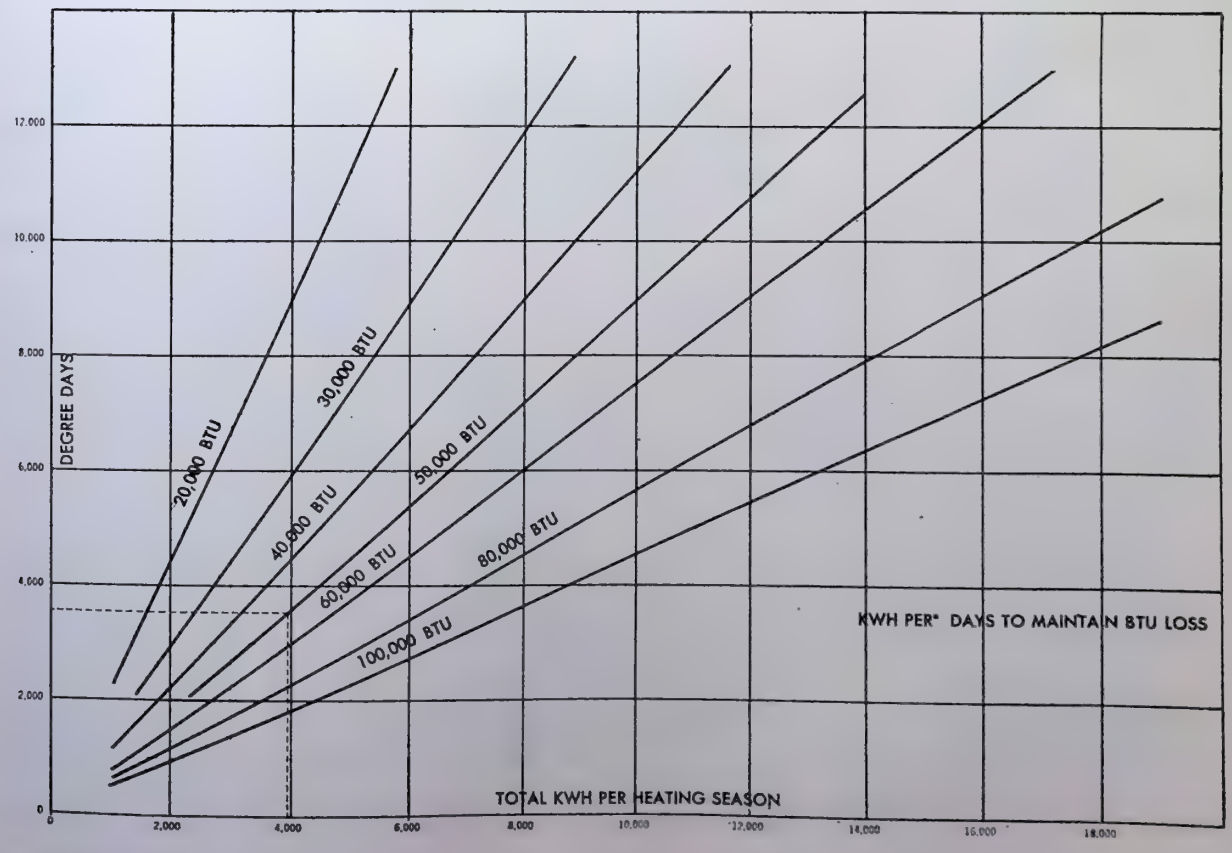
Banished are the dangers inherent in the ordinary heating devices of the past—explosion, fire, asphyxiation. Gone are the annoyances—fumes, irregular temperatures, constant regulating of heating devices. Eliminated are inconveniences and drudgeries—ordering and storing fuel supplies, disposing of ashes and clinkers, constant cleaning due to the presence of soot and other products of combustion.

With Marvair there is safety, convenience, freedom from irksome responsibilities, a tremendous reduction in cleaning bills for furnishings, clothing, walls and home redecoration. There is perfect temperature the year 'round. There is saving of labor. In short, the ultimate in living comfort is realized in Marvair, a single unit providing pleasant temperatures for home or office summer and winter within the economic reach of all.

TABLE VI—Specifications of fans used with the Marvair systems.

	3-hp. System	5-hp. System
Motor size.	½ hp.	½ hp.
Width	21¾ inches	21¾ inches
Length	27 inches	27 inches
Height	22 inches	22 inches
Weight	87 pounds	87 pounds
Cu. ft. a minute	1,500	2,000
Static pressure	¾ inch	¾ inch

FIGURE 6—Graph showing the heating requirements in British thermal units, as calculated by the formulae of the Aamerican Society of Heating and Ventilating Engineers. These capacity figures for Marvair are based on actual operation and experience with the unit. All the information which is needed to make this estimate is the degree days, which are readily available for most areas, and the heat loss for the building, as calculated from formulae developed by the ASHVE. In order to assist in the making of estimates on the power necessary to provide heat for a normal heating season, this chart has been developed by Muncie Gear Works.



Automatic Comfort Controls for Theatres

Well-Engineered Air-Conditioning Systems Provide for Patrons' Year-'Round Comfort

GENE GADDIS
Minneapolis-Honeywell Regulator Company

The value of air conditioning in theatres has become thoroughly appreciated in the past few years by not only the patrons who enjoy the comfort that well-engineered air-conditioning systems offer, but also by the theatre owners themselves. Managers realize a greater return from their investments, attributable to the year-'round healthful and pleasant theatre atmosphere they offer their customers.

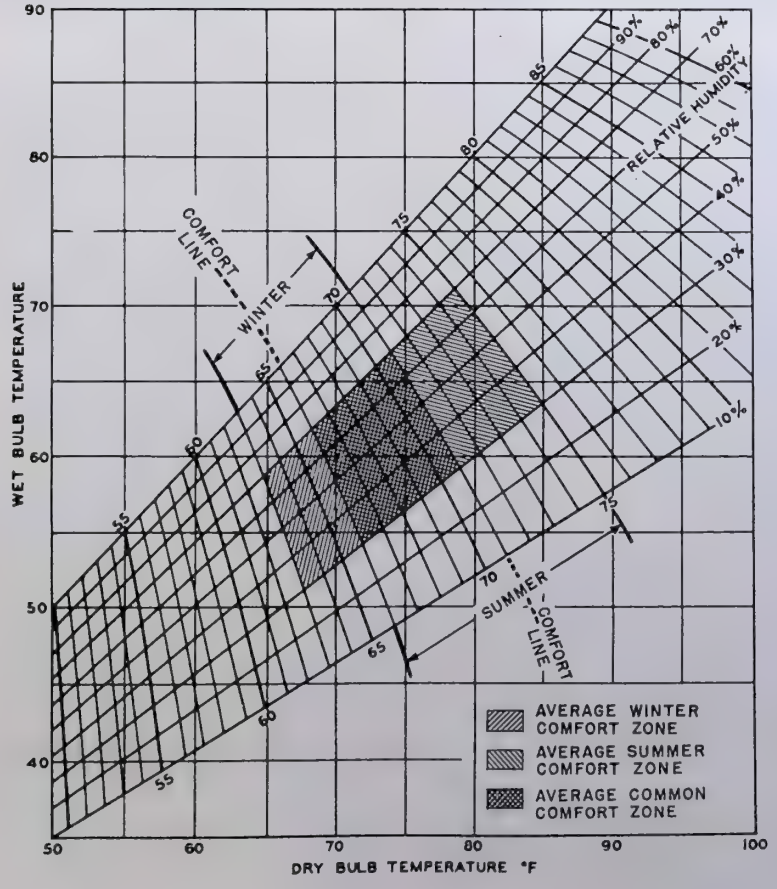
Considerable exhaustive research has been made in the past few years by the air-conditioning industry working in conjunction with many educational institutions such as the University of Illinois, Harvard School of Public Health, and Purdue University. The result of these studies has been the establishment of the practical standards upon which successful air-conditioning jobs can be designed. Although we realize we have but scratched the surface in the development of perfect air conditioning, it is indeed true that a departure is being made from the out-dated, hit-and-miss methods. By making full use of the technical information available at the present time in this fie'd, users may enjoy the best air-conditioning results at the lowest possible cost.

GENERAL COMFORT REQUIREMENTS

It is commonly realized that the comfort of any one individual is dependent not upon one variable, but upon three factors, namely, temperature, humidity and air motion. For example, it is possible for a person to feel perfectly comfortable at a 70-degree temperature. However, if the humidity were to rise to a high value, the rate of evaporation of moisture from his body would be decreased and he would feel uncomfortably hot even though the thermometer still read 70 degrees. On the other hand, with the temperature constant, but the air velocity increased, the person would begin to feel uncomfortably cold, because the rate of evaporation of moisture from his body would thus be increased.

This situation gives rise to the need for a composite index involving these three factors influencing comfort. This arbitrary index is known as "effective temperature." It really is not a temperature at all but a combination of temperature, humidity, and air velocity readings in a single value to indicate the degree of comfort felt by an individual. The numerical value of effective temperature for any given condition is the temperature of saturated, still air which would give the same sensation of warmth or cold. For example, you are sitting in an atmosphere of 70 degrees effective temperature, if you would receive the same sensation of warmth in saturated, still air at 70 degrees.

THE COMFORT CHART shows the average winter and summer comfort zones, and the average comfort zone common to both seasons. This chart represents the results of studies conducted not only in laboratories but also in offices employing large numbers of workers. The effective temperature at which the maximum number was comfortable was called the comfort line. (Reprinted from Heating Ventilating Air Conditioning Guide, 1945.)



THE COMFORT CHART

The picture is further complicated by the fact that no single comfort standard can be laid down which would meet every need. There is an inherent individual variation in the sensation of warmth or comfort felt by persons when exposed to an identical atmospheric condition. The state of health, age, sex, clothing, activity, the degree of acquired adaptation, and length of occupancy seem to be the important factors affecting the comfort standards.

Herein is shown a comfort chart (see below), developed by the American Society of Heating Engineers, on which the average and extreme comfort zones have been superimposed. This chart represents the results of exhaustive studies conducted not only in laboratories but also in offices employing large numbers of workers through the cooperation of the office managers. The extreme comfort zone includes air conditions in which one or more of the experimental subjects were comfortable. The average comfort zone includes those air conditions in which the majority of the subjects (50 per cent or more) were comfortable. That particular effective temperature at which the maximum number of subjects was comfortable was called the comfort line.

The average winter comfort zone, as determined at the ASHVE Laboratory, ranges from 63 to 71 degrees ET (effective temperature); 97 per cent of the experimental subjects were found to be comfortable at 66 degrees ET while at rest, and this temperature was accepted as the

winter comfort line or optimum effective temperature.

The comfort line separates the cool air conditions to its left from the warm air conditions to its right. Under the air conditions existing along or defined by the comfort line, the body is able to maintain thermal equilibrium with its environment with the least conscious sensation to the individual, or with the minimum physiologic demand on the body heat-regulating mechanism. This environment involves not only the condition of the air with respect to temperature and humidity, but also the condition of the surrounding objects and wall surfaces.

The comfort zone tests were made in rooms with wall surface temperatures approximately the same as the room dry-bulb temperature. For walls of large area having unusually low surface temperatures, however, a somewhat higher range of effective temperature is required to compensate for the increased loss of heat from the body by radiation.

The average summer comfort zone for exposures of 3 hours or more ranges from about 66 degrees to 75 degrees ET, based on studies made at the Harvard School of Public Health. The probable optimum effective temperature (for exposures of 3 hours or more) is 71 degrees. These effective temperatures average about 5 degrees higher than those found in winter when customary winter clothing was worn. The variation from winter to summer is probably due partly to adaptation to seasonal weather and partly to differences in the clothing worn in the two seasons.

TABLE 1—Desirable indoor air conditions in summer corresponding to different outdoor temperatures. Applicable to exposure less than 3 hours.

Outdoor Temperature (Degrees F.) Dry Bulb	Indoor Air Conditions with Dew Point Constant at 57 Degrees F. Effective Temperature
100	74
95	73
90	72
85	71
80	70
75	69
70	68

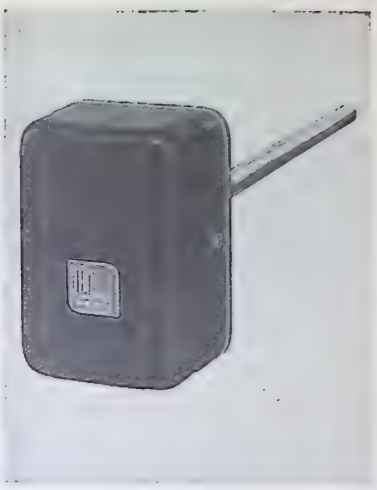
The best effective temperature (for exposures lasting 3 hours or more) was found to follow the average monthly outdoor temperature more closely than the prevailing outdoor temperature. It remained at approximately the same value in July, August, and September, and although the average monthly temperature did not vary much, the prevailing outdoor temperature ranged from 70 to 99.5 degrees. A decrease in the optimum temperature became apparent only when the prevailing outdoor temperature fell to 66 degrees, which is below the customary room temperature in the United States for summer and winter.

In densely occupied spaces—such as classrooms, theatres, and auditoriums—somewhat lower temperatures are necessary than those indicated by the comfort line because of counter radiation between the bodies of occupants in close proximity. In rooms in which the average wall surface temperature is considerably below the air temperature, higher air temperatures are necessary. The reverse holds true in radiant or panel heating methods.

The sensation of comfort, insofar as the physical environment is concerned, is not absolute but varies considerably among certain individuals. Therefore, in applying the air conditions indicated by the comfort line, it should not be expected that all the occupants of a room will feel perfectly comfortable. When the winter comfort line is applied in accordance with the foregoing recommendations, the majority of the occupants will be perfectly comfortable, but there will always be a few who will feel a bit too cool and a few a bit too warm.

The summer comfort line (71 degrees ET) is applicable to the same geographic area as the winter comfort line. It is further restricted to cases in which the human body has reached thermal equilibrium with its environment. As a general rule, this takes place after 1½ to 3 hours' exposure. When a person from outdoors enters a room cooled to 71 degrees ET on a hot day (95 degrees or over) an intense chill is likely to be experienced which is unpleasant. However, after remaining in the room for about 2 hours, this fundamental optimum condition will prove satisfactory to the average person. The summer comfort zone, as well as the comfort line, makes proper allowance for those adaptive changes in the body, and thus applies to homes, offices, schools and other similar places where persons of sedentary occupations spend from 3 to 8 hours or more daily.

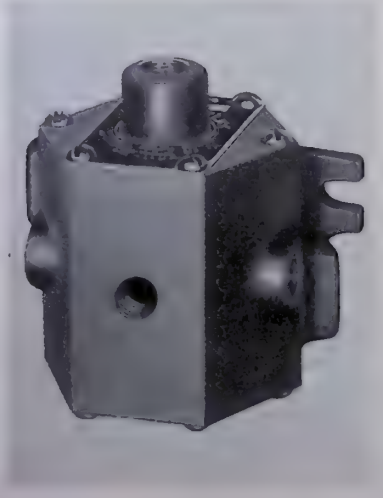
In artificially cooled theatres, department stores, restaurants, and other public buildings, where the period of occupancy is short (3 hours or less), the contrast between outdoor and indoor air conditions becomes the decid-



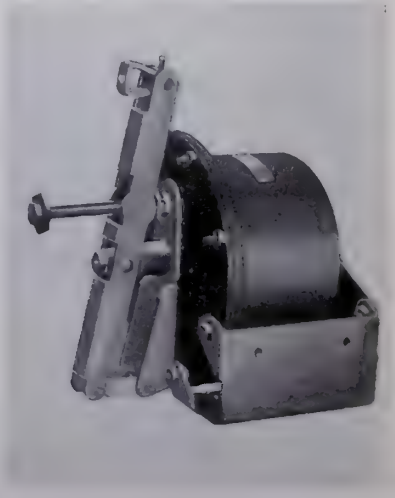
THE OUTDOOR AIR DAMPER (S), located in the manager's office or in that of the maintenance engineer, is of the graduate type and controls outdoor- and return-air dampers through the motors M and M1.

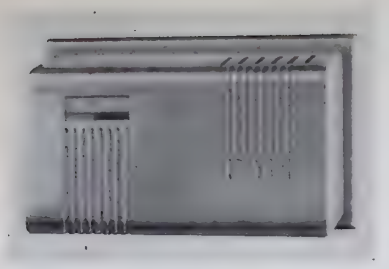
THE CONTROLLER (C3) continuously resets the thermostat (TC), which is a significant part of the system. Another controller (C5), on the outdoor line, controls the modulating valve (V6) and steam supply.

THE RELAY (R1) automatically shifts from the heating to the atmospheric cooling cycle by placing the position of the dampers under the control of C2. The dampers are modulated as the need changes.



THE MOTORS (M and M1), operated through the switch (S), give any desired mixture of air. This establishes the minimum quantity of outdoor air that is taken into the air-conditioning system's ducts.





THE HUMIDITY CONTROLLER (H), located in the conditioned space, operates the humidifier valve (V5) to maintain the desired relative humidity. A special relay closes the water valve when the fan stops.

THE CONTROLLERS are also associated with the modulating space thermostat (C1) and with the shift from the heating to cooling cycle (C2 and C4). The system responds to the immediate needs for sensible cooling.

THE MODULATING SPACE THERMOSTAT (TH) operates through a controller (C1) and a relay (R1). The cooling control thermostat (TC) is in direct control of liquid refrigerant solenoid valves, V1, V2, and V3.

ing factor in regard to the temperature and humidity to be maintained. The object of cooling such places in the summer is not to reduce the temperature to the optimum degree, but to maintain therein a temperature which is temporarily comfortable to the patrons who thus avoid sensations of chill and intense heat on entering and leaving the building.

The relative humidity should be low enough (about 50 per cent or less) to give a sense of comfort without chill and to induce a rate of evaporation which will keep clothing and skin dry. For exposures less than 3 hours, desirable indoor conditions in summer corresponding to various outdoor temperatures are given in Table 1.

CONSIDERATIONS IN DESIGN

In the design of any year-'round air-conditioning system, the following four functions must be provided: (1) Filtering, (2) ventilating, circulating and distributing, (3) heating or cooling, and (4) humidifying or dehumidifying.

In most instances, each air-conditioning installation should be tailor-made to best serve the particular load which is placed upon it. This brings up the importance of the selection of a competent engineer to lay out the job. It is the responsibility of this engineer to make a complete analysis of the anticipated heating and cooling loads and to design or specify equipment with proper characteristics and capacities to meet the maximum or design loads which will be placed upon the installation.

It is significant to note that the system must be designed to meet two and only two situations, and that is to give comfortable inside conditions in the most severe summer weather and in the most severe winter weather. But what about patrons' comfort during the rest of the 363 days of the year? The answer, of course, is an adequate system of control. The control system is not only responsible for compensating the wide varying outdoor conditions but also the varying indoor load.

It is of particular interest to note that an auditorium underheated when empty, may become overheated when filled with people. For example, a crowd of 1,000 people actually give off approximately 384,000 Btu of heat an hour which may offset an extremely large portion of the total design heat loss of the building. This means that a theatre may frequently require cooling during the winter, at the same time that other buildings normally require heating.

Thus it is apparent that a well designed system of control is of prime importance to the owner to modulate the degree of air conditioning to keep the space atmosphere continuously at the optimum condition.

It is quite widely agreed that well designed systems pay off through the following three benefits: (1) Increased comfort, (2) self-liquidating economies, and (3) realization of full value of the systems.

TYPES OF SYSTEMS

The fundamental types of heating systems may be summarized into three main classes:

(1) Direct radiation in which space is heated by radiation alone.

(2) Split system in which the heat loss of the building is supplied by direct radiation, and a central fan system circulates a mixture of return air and outdoor air heated to room temperature by means of steam or hot water coils, or direct-fired furnace.

(3) Blast System—this is the same as No. 2 except there is no direct radiation. The heat loss of the building is supplied through increasing the air discharge temperature.

These basic systems may be combined in various ways by the engineer to meet specific requirements. This is also true of the three basic central fan cooling systems, namely:

(1) Cooling-coil system in which the air passes directly over chilled finned coils. The coils may be cooled either by direct expansion of refrigerant within the coils or by passing chilled water through the coils.

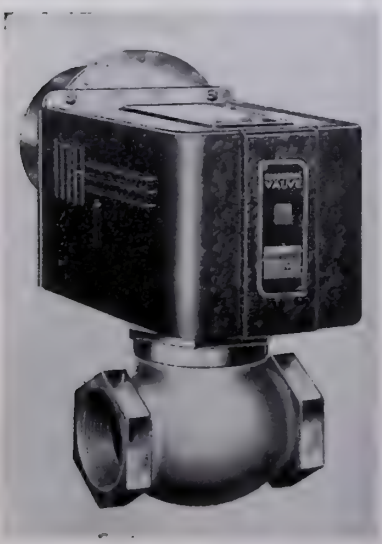
(2) Air-washer system in which the air passes through a water spray which saturates it at a given temperature.

(3) Atmospheric cooling. This involves making use of outside air when its characteristics are satisfactory for handling the inside load. This is an economy measure and should be used as much as possible.

Year-'round systems are developed by arranging the proper combination of a heating system and a cooling system designed to make adequate use of atmospheric cooling.

To be ideal, the control system in addition to performing the various functions outlined above, may also shift the system from the heating cycle, to the atmospheric cooling cycle, to the mechanical cooling cycle automatically, as demanded by the room conditions. The advantages of such a feature are quite apparent:

THE MODULATING STEAM VALVE (V4) is controlled by the modulating space controller (C1) and its associated relay (R1). Other valves are used with the spray humidifier (V5) and the pre-heat coils (V6).



A SPECIAL RELAY (R2) functions to close the water valve when, for any reason, the fan is stopped. Another special relay (R3) closes the dampers in an emergency, to prevent freezing and chilling.

(1) Since in fall and winter it may frequently be necessary to change over several times a day, many man hours by the operating engineer may be saved.

(2) Greater comfort as changeover is made at the correct instant needed.

(3) Saves operating cost, as overlapping of heating and cooling cycles is eliminated.

TYPICAL ALL-YEAR SYSTEM

To summarize and illustrate the principles of air conditioning control described above, refer to the figure below, a diagrammatic sketch of a plant based on continuous circulation of air. This should not be considered as a system ideally applicable to all air-conditioning installations, but as a typical practical application of control to meet one specific set of conditions.

Switch S, located in the maintenance engineer's or manager's office, is of the graduate type and controls the outdoor air and return air damper settings through motors M, and M2, to give any desired mixture of air. This establishes the minimum quantity of outdoor air taken into the system. If, however, the fan is stopped, a special relay R3, goes into action to close the dampers to prevent the possibility of (1) freezing any equipment or (2) chilling the conditioned spaces in building.

Let us now consider specifically, the heating cycle. Humidity controller H, located in the conditioned space, operates humidifier valve V5 to maintain the desired relative humidity. A special relay R2 functions to close the water valve when, for any reason, the fan is stopped.

To prevent sub-freezing temperature air from entering the system, a pre-heat coil is employed in the outdoor air intake. Modulating valve V6 supplies steam to this coil at the command of the outdoor air controller C5. This valve is always closed for outdoor temperatures above 35 degrees.

A modulating space thermostat, TH operating through controllers C1 and R1, controls modulating steam valve V4. V4 throttles just the proper quantity of steam into the heating coil to match the load measured by TH. C1 is a duct discharge controller acting as a low limit to open valve V4 as needed. When TH is satisfied, to insure a minimum discharge air temperature to prevent discomfort from otherwise possible cold drafts.

Atmospheric Cooling Cycle

When steam valve V4 is closed and thermostat TH is satisfied, there is no need for heat from the system. In fact, there is a cooling need if the fan discharge temperature should rise further. When this condition occurs, relay R1, automatically shifts from the heating to the atmospheric cooling cycle by placing the position of the dampers under the control of C2. Outdoor air dampers modulate open and return air dampers modulate closed beyond the minimum position set by switch S as the need for cooling increases.

Mechanical Cooling Cycle

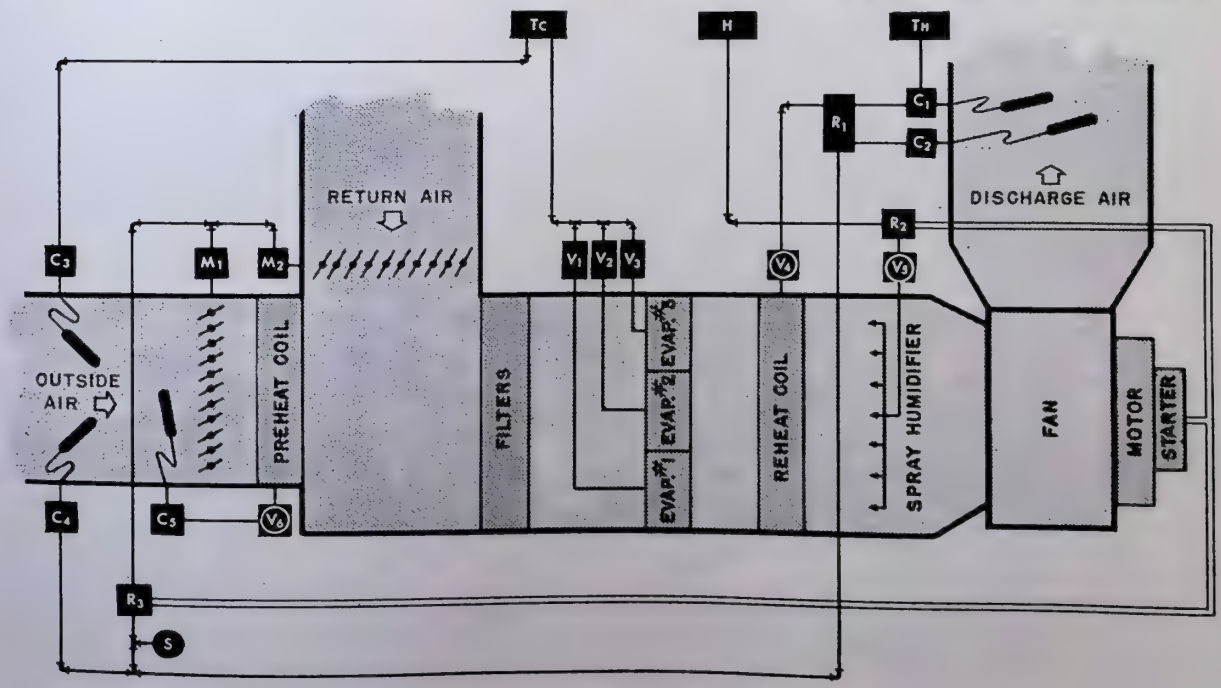
When the outdoor air conditions reach the point at which they are no longer satisfactory for meeting the internal cooling demand, the mechanical cooling cycle automatically takes over. Cooling thermostat TC is in direct control of liquid refrigerant solenoid valves V1, V2 and V3, serving three separate direct-expansion coils No. 1, No. 2, and No. 3. On the initial demand for mechanical cooling, TC puts evaporator No. 1 into operation by opening V1. V2 and V3 are opened in sequence upon increased need for cooling as demanded by TC. It is of particular interest to note that this system not only responds to the need for sensible cooling but also tends to maintain satisfactory relative humidity. If desired, a humidity controller may be added to give precise dehumidification control.

Another significant feature is that the control point at which thermostat TC operates is continuously reset by the outdoor controller C3. For example, we may choose to have the control point vary from 80 to 95 degrees, as the outdoor temperature varies from 80 to 110 degrees, respectively, for the reasons set out in the early part of this discussion.

CONCLUSION

We believe that this story on the control of air conditioning equipment to maintain year-round comfort will lead to a more vivid realization of what the industry is offering the public through modern theatres. Tremendous advancement has taken place in the past few years over early attempts at air conditioning, which frequently may have consisted of a fan blowing over a cake of ice. The developments already made, as well as those anticipated, are devoted to the cause of improving human health and comfort, and will in turn be of commercial value to those interested in providing these benefits to their patrons. In this modern age, the discerning public not only expects air conditioning but will take its patronage where sound engineering designs spell comfort on a year-'round controlled basis.

A TYPICAL MINNEAPOLIS-HONEYWELL YEAR-'ROUND AIR CONDITIONING SYSTEM is diagrammatically represented in this drawing. The various items represented on the diagram are pictured on the preceding pages, where uses have been tagged according to the above plan. This representation should not be considered as a system ideally applicable to all air-conditioning installations, but just as one single, typical, practical application of control to meet one specific set of conditions. In this modern age, the discerning public not only expects but demands air conditioning. (All illustrative material through the Minneapolis-Honeywell Regulator Co.)



Control of Corrosion in Air Conditioning

How to Employ Chromate to Best Advantage In Central Systems and Unit Conditioners

Corrosion may cause serious damage to spray chambers, cooling towers, condensers, compressors, piping, pumps and other equipment of air conditioning systems. Corrosion products may reduce heat transfer rates and clog spray nozzles. The nature of the water passages in such installations prevents successful protection by painting, plating and similar methods. Nor is it possible to prevent corrosion by constructing parts subject to severe attack from such corrosion-resistant metals as copper or brass. The effect of adding a second metal is to promote pitting of adjoining metal by galvanic action and thus cause more harm than the initial condition. The practical solution is to treat the water itself to reduce its corrosiveness.

The most effective corrosion preventive is treatment of the water with chromate or bichromate.

Most central and unit plants for washing and conditioning air require water to be recycled in a continuous circulating system of a kind which benefits most from small inhibiting doses of chromate. Chromate protection is impractical with equipment through which water passes only once and then to waste.

RECIRCULATING SYSTEMS

The rapidly expanding use of air conditioning equipment has often overtaxed municipal water mains and overloaded sewage systems. As a result most large cities now restrict the amount of water allowed to be used for air conditioning. This often makes it necessary, as well as economical for large installations, to employ recirculating water systems. In these systems corrosion products, rust, sediment and slime, accumulate and may cause trouble long before corrosion seriously damages equipment. Fortunately control of corrosion is simple in a recirculating water system where a small dosage of chromate or bichromate is highly effective.

Optimal dosage of chromate depends on the character of the water and of the system; but, in general, excellent results are obtained with a maintained concentration of about 250 parts of chromate per million parts of water. Maintaining the desired conditions in various commonly used systems will be discussed later.

Chromate Protection

Chromate inhibits corrosion by forming a thin passivating film on the surface of the metal exposed to chromate solutions. The nature of this passivation and its formation are beyond the scope of this discussion. Suffice it to say that a quantity of sodium chromate as small as 2 to 4 pounds per thousand gallons (250 to 500 parts per million) in water prevents corrosion for most practical purposes. Once a passive state has been established, smaller concentrations of chromate effectively maintain it. Necessarily the water must not be acid in character—preferably it should be slightly alkaline—and the concentration of dissolved salts should be less than 1,000 parts per million (0.1 per cent). The less dissolved salt, particularly chlorides, the better. Actually chromates reduce the corrosion at any salt concentration, but cannot prevent it entirely at high concentrations.

The several types of systems employed in air conditioning require minor differences in chromate treatment to give maximum protection from corrosion; but, in general, the method is simple to apply and highly effective in use. Its principal points are summarized here.

A small amount of chromate is consumed in forming a protective film over the metal surfaces; and another small amount oxidizes reducing substances in the raw water, or brought in by the air with which the water comes in contact. The amount of chromate thus consumed depends on individual conditions which cannot be estimated in advance. The effect of this loss of reagent is offset largely by the excess added initially.

Chromate Required

Allowance for chromate consumed in protecting the metal may be made by following the accompanying charts. These show the number of pounds of sodium chromate consumed per 1,000 square feet of completely submerged and aerated ferrous surface at normal room temperature (70 degrees Fahrenheit) with the water maintained slightly alkaline (pH 7.5 to 9.5). The effects of various amounts of chloride are shown by the several graphs. At higher temperatures the rate of consumption of chromate increases somewhat.

Figure 1 shows the behavior of good water containing 10 ppm sodium chloride (salt); Figure 2, a fair to poor water containing 100 ppm salt; Figure 3, a very bad water containing 1,000 ppm salt, as might result from concentration in an evaporative cooling system; and Figure 4 shows an extreme condition, 10,000 ppm salt. These graphs show:

(1) The rate of consumption of chromate is relatively high during the first few days, falling off rapidly during the first month, and gradually thereafter until the system becomes stabilized within about three months.

(2) With chromate concentrations maintained at 25 to 50 ppm, the rate of consumption is initially erratic, exceedingly high and unsatisfactory, but improves strikingly with time.

(3) In general, the consumption of chromate is highest at about 50 ppm, often higher than at 25 ppm. It rapidly decreases from 100 to 250 ppm. Optimum efficiency is reached at about 500 ppm, with a slight drop at 1,000 ppm except in the presence of large amounts of chloride which require the highest concentration of chromate. For practi-

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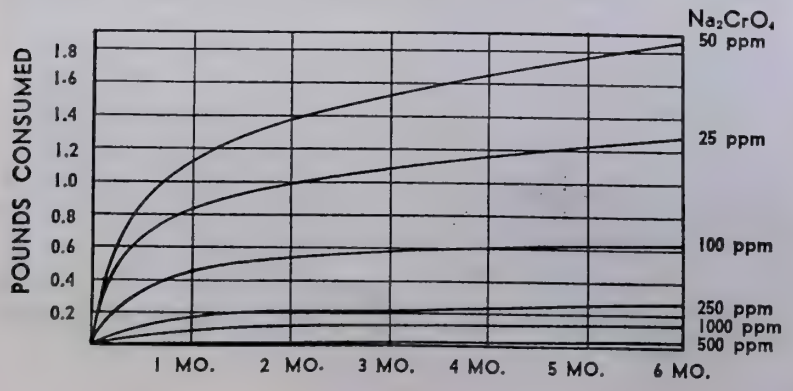
FIGURE 1—The behavior of a good water, containing 10 ppm of sodium chloride (common salt), shown in terms of the number of pounds of sodium chromate consumed for each 1,000 square feet of ferrous surface, for various concentrations, and for various time periods. The rate of chromate is relatively high during the first few days, rapidly falling off during the first month. Data by Research laboratories, Mutual Chemical Company of America.



cal purposes, there is little difference in the rates of consumption after three months in the range of concentrations from 250 to 1,000 ppm.

(4) The general effect of increased concentration of chloride is to accelerate the consumption of chromate, especially during the first few days, and to increase the concentration of chromate required to protect the metal surfaces.

Estimating Optimum Concentration

From the curves, and the amount of water required for makeup, the most economical concentration of chromate can be estimated for the particular concentration of chloride which may be encountered. This is the concentration at which the sum of the reagent drawn off and that consumed has a minimum value. To provide a factor of safety, it is ordinarily advisable to figure on a concentration of chromate not less than 100 ppm, even if calculations should indicate a lower dosage to be economical. Nor should one attempt to employ minimum amounts of chromate before the system has been in operation long enough for the protective film to be well formed and stabilized.

When the recirculated water is cooled by evaporation, as for example in a tower or spray pond, the optimum concentration of chromate depends on the design of the equipment, the temperature and the salt content of the water. Unless the water is initially very low in dissolved salts, or unless there is considerable mechanical loss by windage, overflows or leakage, periodic draw-offs of recirculating water to waste are made in order to keep dissolved solids from becoming too highly concentrated. For instance, suppose a raw water contains 100 parts per million of sodium chloride, and that it loses by evaporation 10 per cent of its volume at each pass through the cooling tower. At the end of 90 recirculations with no mechanical losses, the cooling water would contain 1,000 ppm salt. Obviously some water has to be run to waste to carry off accumulating salt, and since this run-off contains chromate, the importance of using the lowest effective concentration of chromate is apparent. However, excess chromate not only increases the safe limit of salt concentration, but at the same time reduces the amount of chromate consumed in protecting metal surfaces. Consequently it is best to start with a comparatively high concentration, 500 to 1,000 ppm, and gradually reduce the amount of chromate over a period of months to the lowest concentration at which the particular installation is effectively protected.

Stabilized Operation

Since chromate is concentrated by evaporation of the treated water at approximately the same rate as the salt in the raw water, the effect of this concentration must be considered in figuring make-up. For example, assume that 250 ppm is the desired chromate concentration, that 10 per cent of the treated water is evaporated on each circulation through the cooling tower, and that this amounts to 1000 gallons per hour to be made up by addition of raw water containing 100 ppm sodium chloride. If the maximum concentration of chloride for satisfactory operation is 1000 ppm, it is necessary to run to waste 100 gallons per hour to keep the concentration below this permissible maximum. Since this draw-off contains 250 ppm of chromate, it is necessary to add an equivalent amount of chromate to the make-up water. But, the make-up is ten times the volume of the draw-off, so it need contain only one-tenth the concentration, namely 25 ppm chromate. In this case, 25 x 1000 x 8.33 divided by 1,000,000 equals 0.21 pounds of chromate an hour is required.

The same general method of calculating draw-off and chromate addition applies to all open coolers, cascade towers, spray towers, natural draft towers, mechanical draft towers, evaporative condensers, spray ponds, natural ponds, or other devices which operate through atmospheric evaporation of the cooling water.

Use of Bichromate—The most economical form in which to add chromate is sodium bichromate plus sufficient caustic soda to neutralize it (raise the pH to about 8 to 9). This requires the addition of about 27 pounds of caustic soda for each 100 pounds of sodium bichromate, the precise amount of caustic depending on the natural alkalinity of the water. Both compounds can be added in solid form for convenience. The addition of caustic soda to sodium bichromate forms sodium chromate. One pound of sodium bichromate is equivalent to 1.0871 pounds of sodium chromate. The bichromate goes farther, costs less per pound, and is the form most readily available. The technical granular grade of bichromate usually employed comes in 100-pound bags.

When the treatment of a system is started, the consumption of bichromate in establishing protection of the metal surfaces will be higher, and that of caustic lower than after the system has been in operation for some time. As mentioned, conditions usually become fairly constant after three months, and fully stabilized within six months. Thereafter regular additions of chromate may be made at intervals, with only occasional inspection for color and alkalinity.

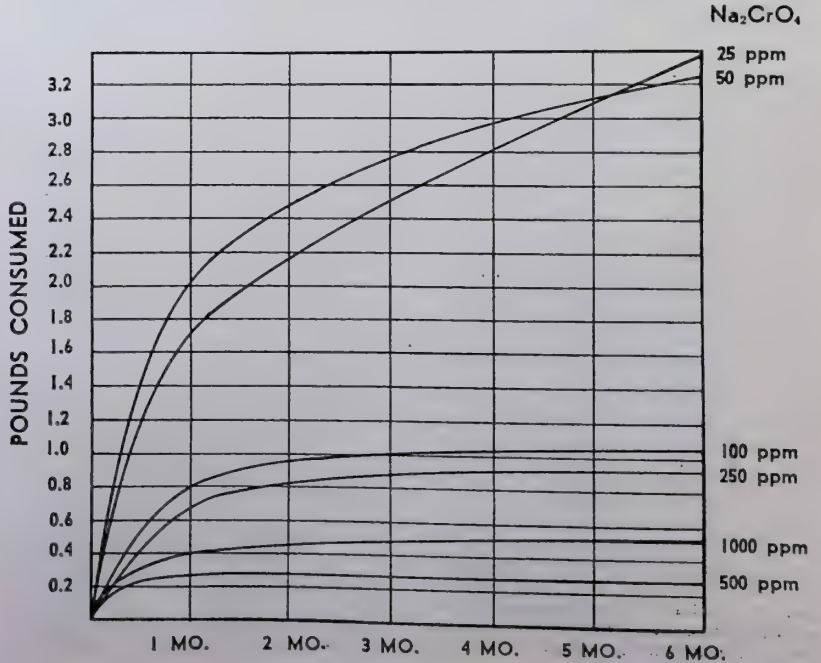
Testing—The correct alkalinity (pH) in the treated water is important. It may be judged by adding a drop of phenolphthalein indicator to a glass of the water. The indicator turns faintly pink at about pH 8.5. Excess caustic, which turns phenolphthalein a deep red, is less harmful than a deficiency.

The correct concentration of chromate may be estimated by judging the depth of the yellow color imparted to the water. Both are simple tests which anyone can learn in a few minutes.

TYPES OF WATER SYSTEMS

The numerous kinds and combinations of water systems employed in air conditioning can be classified from the corrosion viewpoint, as (a) spray chambers for washing, cooling, humidifying (or dehumidifying) the inside air; (b) condensers and other heat-exchange apparatus for removing heat from the medium which cools the inside air; (c) cooling towers and other evaporative

FIGURE 2—The behavior of a fair to poor water, containing 100 ppm of sodium chloride (common salt), shown in terms of the number of pounds of sodium chromate, for various concentrations and for various periods of time. With chromate concentrations maintained at 25 to 50 ppm, the rate is initially erratic, exceedingly high and unsatisfactory, but strikingly improves with time. Data by Research Laboratories, Mutual Chemical Co. of America.



coolers which transfer the heat from the recirculated cooling water to the outside air; (d) heating coils for winter use and for other purposes requiring heat.

Bimetallic Corrosion Controlled

The best way to combat bimetallic corrosion is, of course, to eliminate dissimilar metals, but this is often impractical for structural reasons or because of existing installations. A partial remedy is to insulate, as by painting, the cathodic metal. It is less helpful to paint corroded steel or iron (anodic metal) near exposed brass, since this may increase the density of the resulting galvanic current at unavoidable pores or breaks in the coating on the iron or steel, and thus intensify pitting; or it may transfer the corrosion to some other anodic area. Instead, the brass (cathodic metal) should be painted.

Although it is best to avoid contact of dissimilar metals, and higher concentrations of chromate are required usually when dissimilar metals are present, no difficulties are encountered in protecting an ordinary iron or steel system having only a few contacts with brass. Some extremely bad bimetallic combinations (aluminum-copper, or zinc-copper, for instance) though benefited, cannot be completely inhibited by chromate, especially in the presence of chlorides. These combinations are usually, but not always, avoided by designers of air conditioning equipment. In Pittsburgh, for instance, two buildings were found to be equipped with air-washing equipment having aluminum spray chambers containing copper screens. In both, the aluminum pitted very badly near the contact with the copper within a few weeks. In the first building, the true cause of the corrosion was not recognized,—the aluminum was blamed—and the costly expedient of replacing the aluminum with lead provided only a partial remedy. In the second building, the difficulty was recognized as bimetallic attack and was remedied simply and completely by replacing the copper screen with an aluminum screen.

Since the external piping and pumps which recirculate water through spray chambers are almost universally made of iron or steel, chromate is required to inhibit corrosion of these parts, even when the spray chamber is of a corrosion-resistant material.

The amount of chromate required for an all-aluminum system is substantially lower than for all-iron. An all-galvanized or zinc system also requires less chromate than an all-iron system, provided, of course, that contacts with copper and brass are avoided. If iron in a galvanized system is exposed, the same concentration of chromate as for an all-iron system is safe to use. Even a little less chromate can be employed in such a case, since the inhibiting action of chromate is supplemented by that of zinc, which gives additional protection to nearby iron. Chromate, in addition to passivating the iron, may also deposit a protective film of zinc chromate on the galvanized surface, thus protecting both iron and zinc simultaneously.

Aeration Corrosion Controlled

Even without bimetallic contacts, aeration which cannot be avoided in air conditioning equipment, creates danger of severe corrosion. For this reason alone it is advisable to employ chromates in practically all air conditioning water systems, since the efficiency of chromate for inhibiting corrosion is unaffected by aeration.

Spray Chambers

The difference between a spray chamber and a cooling tower is one of purpose rather than principle. In the spray chamber of an air washer, an excess of water conditions a fixed amount of air; in a tower, or other evaporative cooling equipment, an excess of air cools a fixed quantity of water. Recirculating water is used in spray chambers for cooling, dehumidifying (humidifying in winter), and cleansing air. The temperature of this water ranges from 34 to 70 degrees Fahrenheit. Cooling and heating coils may be used in the spray chambers, and the recirculated water sprayed onto the coils or fins, which may be of dissimilar metals. Extreme examples are copper coils with aluminum fins. Spray nozzles may be of Monel screwed onto steel nipples. The spray chamber may be constructed entirely of steel or chiefly of steel with some copper parts, or it may be made of copper with steel pipes. Serious corrosion results unless chromate is used in these systems.

Cooling Towers

A cardinal problem of air conditioning is to remove and dissipate heat from the compressed refrigerant, or from the discharge of a steam jet vacuum cooler. In small units the compressed refrigerant is cooled by a fan blowing air directly through a coil, very much as in the familiar household refrigerator. But preferably, an exchanger transfers the heat to a water system, from which it is dissipated in a number of ways.

Evaporative condensers, which may replace tower coolers, operate on the same principle. The evaporative condenser is actually a cooling tower within which is piped the liquid being cooled by the evaporative effect of water sprayed over the pipes. This sprayed water is recirculated, with an accompanying concentration of dissolved salts as described above. Optimum chromate concentration is estimated by the method already given.

LARGE CENTRAL SYSTEMS

Excellent results have been obtained with chromates for combating corrosion in a number of large central installations over a period of years. As mentioned, the amount of chromate required depends on individual factors, chiefly: amount, nature and location of dissimilar metals; character of water, including its temperature, chloride content, and pH; volume of water in relation to the metal surface with which it comes into contact; loss of water by overflow, drawoff, leakage, windage, and evaporation; character of air, such as presence of acidic or reducing gases, organic dusts, etc. These variations make it difficult to predict the minimum amount of chromate which will protect a particular installation. In general, a maintained chromate concentration of 250 ppm will be satisfactory; but the treatment should be initiated with 500 ppm and kept at about this concentration until rust and old corrosion products have been loosened and removed from the system, and the water has a clear, light yellow color. If there is little loss of water from the system, there is some economy in maintaining this concentration, since consumption of chromate in the chemical protection of the metal surface is lowest at a fairly high chromate concentration, as shown by the accompanying charts. If there is considerable overflow or other loss of liquid from the system, then the resulting mechanical loss of chromate may be sufficiently important to justify lowering the chromate concentration by small amounts down to the minimum effective concentration; but it is seldom desirable to operate below 200 to 250 ppm, since this entails frequent testing and is less effective.

As in other circulating water systems, the concentration of chromate may be judged by comparing the yellow color of the water with that of solutions of known strength. It is also essential that the pH of the water be fairly high (7,5 to 9.5). This should be checked from time to time in the customary manner with phenolphthalein. If the water does not give a faint pink color with this indicator, caustic soda should be added. Good practice, when starting to use chromate, requires checking the yellow chromate color and alkalinity once a week, and making such additions of bichromate and caustic soda as may be indicated. Later, checks may be less frequent. Excess chromate does no harm, and as pointed out, this increases the consumption of chromate only with respect to mechanical loss.

UNIT SYSTEMS

In trials at Pittsburgh with several small York air-conditioning units (34x37-inch washers), one Carrier (26x30-inch washer), and one Sturtevant air washer (60x60x84-inch spray chamber), weekly observations over a period of 18 months showed that the use of sodium chromate prevented corrosion and eliminated the formation of slimes. Two new units without chromate accumulated a large amount of slime during the same period. One old unit which had accumulated slime and rust prior to the test completely cleared during the 18-month chromate treatment. Because of fluctuations in overflow the concentration of sodium chromate varied between 100 and 500 ppm. Each week it was adjusted to 500 ppm, on the basis of yellow color which was found satisfactory for practical purposes. Although most of the make-up chromate was needed to offset mechanical loss through the water overflow, some was consumed in oxidizing organic material removed from the air. Many bacteria, molds and accompanying odors are thus destroyed. These results have been

substantiated by other practical observations extending over a period of eight years.

MOBILE UNITS

About half of our air-conditioned railway passenger cars depend on mechanical compressors functioning like those in stationary installations. However, cooling water cannot be run to waste and must be recirculated through air-cooled or evaporative coolers. Some compressor systems are powered from car axles; others are powered by gasoline or other internal combustion engines which must be cooled by water continuously recirculated, sometimes through the same cooling device employed for the refrigerant cooling water. About 15 per cent of passenger cars are conditioned by steam jet systems. The method of using chromate for corrosion protection of these systems is almost the same as for similar stationary equipment. A lower concentration of chromate may sometimes be used because the quality of the water is usually better, evaporative concentration is low, and often the equipment is under better supervision.

Similar considerations apply to air conditioning systems being developed for buses, automobiles and aircraft. For marine equipment, the recirculated water is cooled by seawater heat exchangers. Chromate is effective in the primary enclosed water system, but of course does not protect the open system—the outside of the tubes and inside of the shell of the heat-exchanger—against corrosive action of seawater.

SPECIAL APPLICATIONS

Specialized air conditioning equipment is employed for many industrial purposes, control of crystallization, exhaust systems, dust removal, spray booths, chemical laboratory and kitchen hoods, drying systems, rotary driers, etc. Many of these special applications employ recirculating water systems, in which corrosion can be profitably inhibited by small amounts of chromate. The use of chromate for inhibiting refrigeration brines is a specialized application.

HEATING COILS

Harmful corrosion is seldom found in a properly designed hot water heating plant unless the water is frequently renewed. When protection against corrosion is required in a hot water system, chromate may be employed in the same manner as for other closed recirculating systems. The proportions and manner of application are essentially the same as those used for the engine-jacket water of a locomotive Diesel. Chromate is effective, its cost is negligible and its application is simple. These systems have a minimum of bimetallic contact and, being completely enclosed, have negligible evaporative loss to concentrate mineral salts.

TOXICITY OF CHROMATE

Bichromate and chromate, and their solutions may irritate the skin if exposure is prolonged. Simple washing after handling these materials and covering existing skin lesions—precautions prudent with most chemicals—eliminate any difficulty from this source. The dilute solutions employed in corrosion prevention present no appreciable hazard, although such solutions obviously should not be swallowed or allowed to remain in contact with the body for long periods of time.

Any possibility of carryover of chromate from spray chambers into the conditioned air is prevented by baffles built into the equipment. Various state and federal health departments specify that the maximum permissible amount of chromate may not exceed the equivalent of 0.1 mg of CrO_3 per cubic meter of air. Such an amount is never attained in practice. To detect the presence of chromate, note any yellow color imparted to a piece of bleached muslin hung over the air-discharge grille. A more precise method is to draw a measured volume of air through an impinger tube determining the amount of chromate absorbed by means of diphenylcarbazide.

SUMMARY

The huge amounts of water required by air conditioning equipment for washing, cooling, and condensing purposes create serious economic problems in many localities. High water cost usually requires the installation of recirculating systems to save water, and the use of chromate to save the systems. In most instances the amount of chromate is so small that its cost is negligible.

The purpose of this article is to show how to employ chromate to best advantage in various central systems and unit air conditioners. Data show chromate consumption and the effects of chloride concentration. Treatment can often be advantageously started with a comparatively high concentration of chromate, later reducing the concentration when the protective film is stabilized. Two simple color tests give adequate control. Graphs and examples will assist the engineer.

FIGURE 3—The behavior of a very bad water, containing 1,000 ppm of sodium chloride (common salt), as might result from concentration in an evaporative cooling system, shown in terms of the number of pounds of sodium chromate, for various concentrations and times. Data by Research Laboratories, Mutual Chemical.

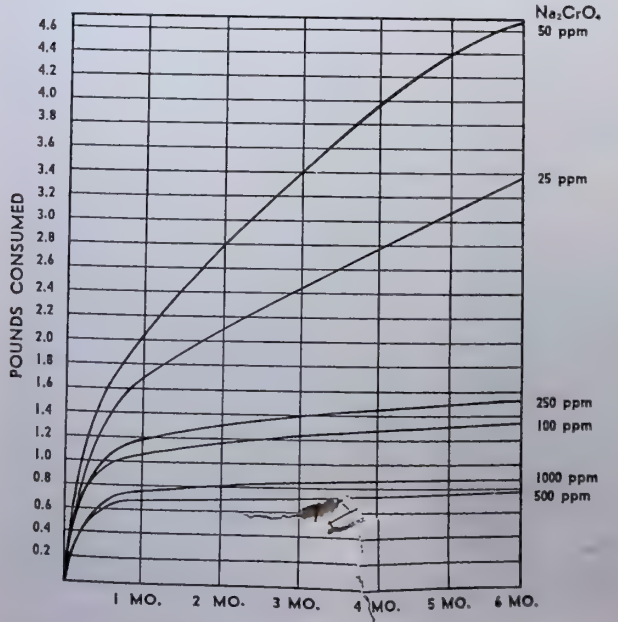
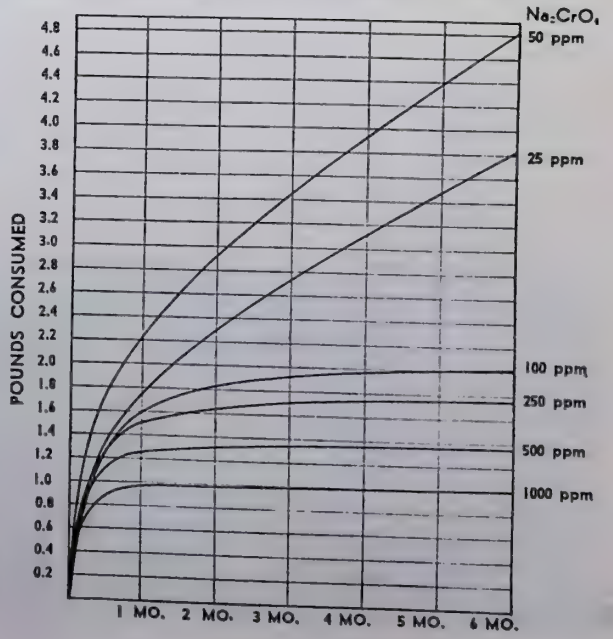


FIGURE 4—The behavior of an extreme condition, where the water contains 10,000 ppm of sodium chloride (common salt), shown in terms of the number of pounds of sodium chromate that is consumed, for various concentrations and periods of time, up to six months. Data by Research Laboratories, Mutual Chemical Company.



Thermal Insulation and Air Conditioning

Use of Mineral Wool Suggested as Adjunct In Efficient Operation of Cooling Plant

WINCHELL ROYCE
Formerly Building Page Editor, Newsweek and New York World-Telegram

Stymied for nearly seven years in carrying out plans for modernization because of wartime controls and shortages, the theater industry today is engaged in a rush to resume installation of air-conditioning or other types of cooling equipment. By the spring of 1947, air-conditioning and refrigeration machinery manufacturers expect to be swamped with orders.

Although theaters were among the first business houses to cool their premises during the hot summer months in order to avoid sharp seasonal slumps in revenue, there is still a large percentage of the nation's cinemas which do not have cooling systems. Particularly is this true in smaller communities.

Because the phrase "20 Degrees Cooler Inside" has been emblazoned on theater marquees for the past 15 years or so, the public has the idea that all theatres are thus modernized. But in only one recent week, five large theatres in New York's suburbs applied for permits to drill wells to provide water for cooling systems which they plan to install before summer. Nearly a score of others in the same area have placed orders for mechanical refrigeration machinery. That gives an idea of the trend.

A corollary to air conditioning is thermal insulation of the building. Unable to install cooling plants for the past six or seven years, many theatre operators turned to insulation as a quick, inexpensive, partial remedy because proper insulation between the ceiling and roof materially reduces the penetration of heat which frequently is as much as 140 degrees on roofs.

Those theatres already adequately insulated will find that when the cooling equipment is installed, its cost of operation will be considerably lower and its efficiency considerably higher than in the uninsulated building, according to dozens of case histories compiled by the air-conditioning people and manufacturers of thermal insulation products.

For example, the Savoy Theatre in Bloomfield, New Jersey, had 2,660 square feet of mineral wool granular insulation placed 4 inches thick over the entire auditorium ceiling. "Before the insulation was blown in," the theatre manager wrote the manufacturer, "the air-conditioning compressor motor operated constantly. Now there is only intermittent operation. The resulting savings in electrical costs, plus the fuel savings during the heating season, paid for the cost of the insulation in two years."

The owner of the Town Theatre in Omaha, Nebraska, which was similarly insulated, stated, "The insulation enabled me to use 20 tons less refrigeration, the cost of which more than paid for the insulation."

Such experiences are due to the fact that proper insulation of any building lowers interior temperatures as much as 15 degrees. Therefore it is not necessary to operate the cooling system at capacity because the blanket of insulation acts as a barrier to heat and cold. In addition to reduced operating costs, intermittent use results in lessened wear and consequently longer life for the cooling machinery, according to air conditioning engineers.

Most widely-used material for effectively insulating buildings of all types is mineral wool, according to the United States Bureau of Mines, which is urging thorough insulation of all human-occupied structures as a fuel-conservation measure. It is most effective and economical when installed "full-thick," about 4 inches, the Bureau of Mines asserts.

Mineral wool is a generic term for a fluffy, wool-like substance made from limestone and other rock, called "rock wool"; the slag from ore smelting, called "slag-wool"; and from sand, when it is known as "glass wool." It cannot burn and resists moisture, termites and decay, is clean and easily handled and installed. All types have virtually the same properties and at least one of the three can be readily obtained in every section of the country. The material is manufactured in both batts and granular form.

The type most commonly used for theatre insulation is the loose or granular form which is placed as fill insulation in existing structures. It is generally installed by blowing machines to a depth of 4 inches above the upper ceiling without interference with normal business routine or creating dirt or muss. The batt or blanket type is installed during construction of new buildings.

Because it is a barrier to heat and cold, theatre owners have found that proper insulation likewise results in appreciable savings in fuel costs for heating. This is because most theatre ceilings are high and expensive heat rises to the roof, seeking an outlet, far above the heads of the audience. Consequently, long periods of forced firing of the heating plant are necessary to maintain comfort for patrons.

For example, the management of the previously-cited Savoy Theatre in Bloomfield, New Jersey, reported thus on its heating experience, "Since the mineral wool insulation was installed in the ceiling of our theatre, we have been able for the first time to heat the stage end of the auditorium to 70 degrees. Prior to the installation it was impossible to heat that end beyond 64 degrees. In addition, it was formerly necessary to start the fire at least four hours before the performance began, but now the fire is started only one hour before the performance."

Management of the Victoria Theatre in Ottawa, Canada, estimates that its coal consumption has been reduced between 35 and 40 per cent since covering the 4,750 square feet of the theatre's ceiling area with mineral wool. Prior to insulating, an average winter evening found that although the steam plant was forced to utmost capacity, the auditorium temperature could not be brought to more than 56 degrees. Patrons complained. Every time a cold spell arrived, attendance was meager even when outstanding attractions were presented. Profitable operation was becoming impossible. After insulation, however, the owner reported that even when outside temperatures fell to 20 degrees below zero, a pound and a half of pressure in the steam lines held the auditorium at 70 degrees. The result was that in addition to 40 per cent fuel savings, attendance snapped back to normal.

GRANULAR MINERAL WOOL INSULATION is being blown to full thickness into the area above the theatre roof. This type of insulation, which adds to the comfort of patrons, at the same time that it reduces operating costs, can be applied without interrupting normal operations. Said the manager of the Savoy Theatre, Bloomfield, New Jersey, where this insulation was used, "The resulting savings . . . paid for the cost of installation in two years."

New Liquid Insulation for Theatre Roofs

Aluminum Paint, Reflecting Heat of Sun, Helps to Keep Auditorium Cool in Summer

A new aluminum roof paint, which forms a reflecting, protective covering over a structure and reduces inside temperatures by as much as 15 degrees, may solve the problem of many a theatre owner who needs but cannot obtain air-conditioning, the United Gilsonite Laboratories recently announced.

The paint, a liquid form of insulation that reflects 80 per cent of the sun's destructive rays, recently solved the problems of a New York theatre chain owner who obtained a new theatre but no air-conditioning equipment. After a quick inspection of the warm and uncomfortable building, the owner decided that if "the show must go on"—so must some aluminum roof paint.

Louis Blitztein, the contractor who handled the work for the Jackson (later re-named Crest) Theatre in Long Beach, New York, found the job a speedy and profitable operation.

The theatre had a sloping corrugated metal roof with fiber-asbestos coating. Each of the two slopes was 35 x 70 feet which meant an application of 2,450 square feet on each slope, and a total of 4,900 square feet for the entire roof. But one mechanic using a 6-inch roofing brush was able to cover an entire slope in 3 hours.

Fifteen gallons of aluminum paint were used, an average of more than 300 square feet to the gallon, and the only equipment that was tied up for the job was the roofing brush. In all, the entire operation took less than a normal work day for completion, and left the theatre not only cooler, but clad in a bright and attractive gleam.

GROWING DEMAND ILLUSTRATED

The need for such a product is apparent in statistics which show that while there are over 25,000 theatres in the country, only a little over 3,000 possess air-conditioning equipment and add to this the number of small pre-fabricated theatres that are springing up over night. The latter, with a house capacity of 300 to 400, have too small a patronage to warrant the expense of air-conditioning equipment.

Gerald B. Payne, vice president of the United Gilsonite Laboratories, said the company has also received gratifying reports concerning the need for the new paint from many other fields.

"In cities, large and small," said Payne, "factory and warehouse owners as well as operators of small plants and business structures, have expressed a keen interest in both the protective and insulative features of the gilsonite aluminum roof paint.

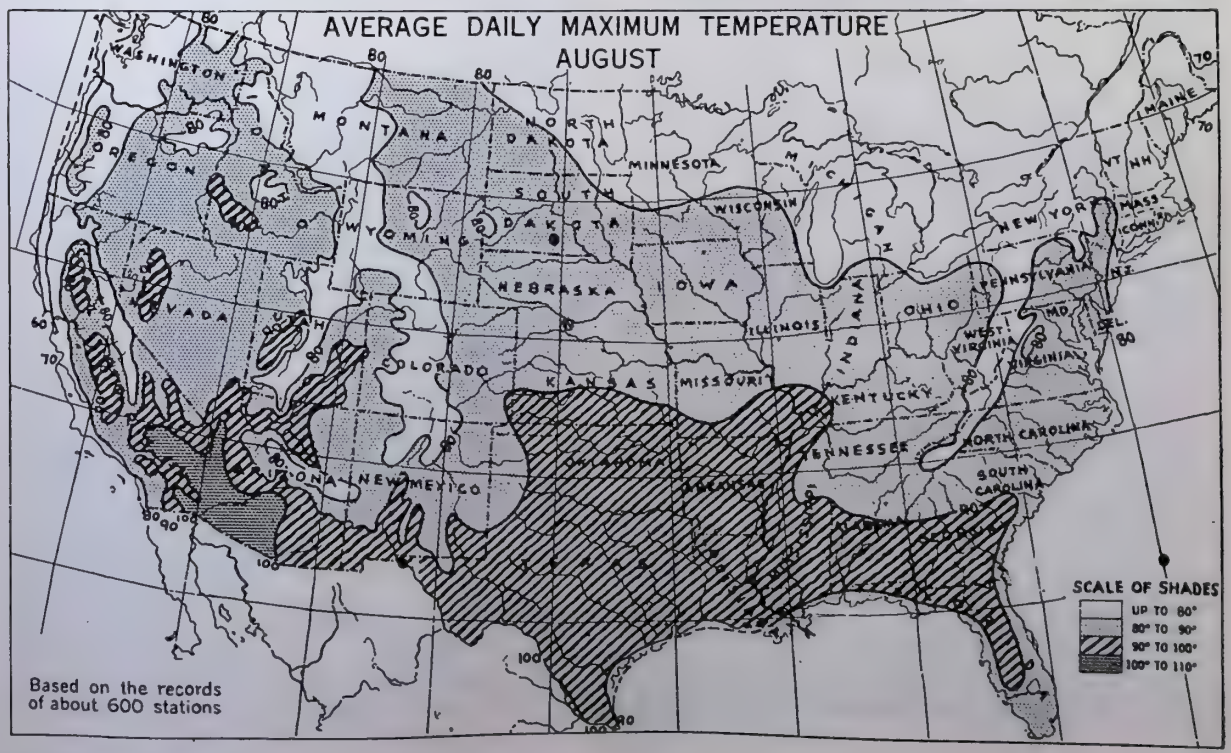
"In some cases where summer heat and the comparative high cost of insulation have been alarming factors, resident and apartment house owners have ordered the new product with the prospect of enjoying a comfortable summer in living quarters formerly unbearably hot in the summertime.

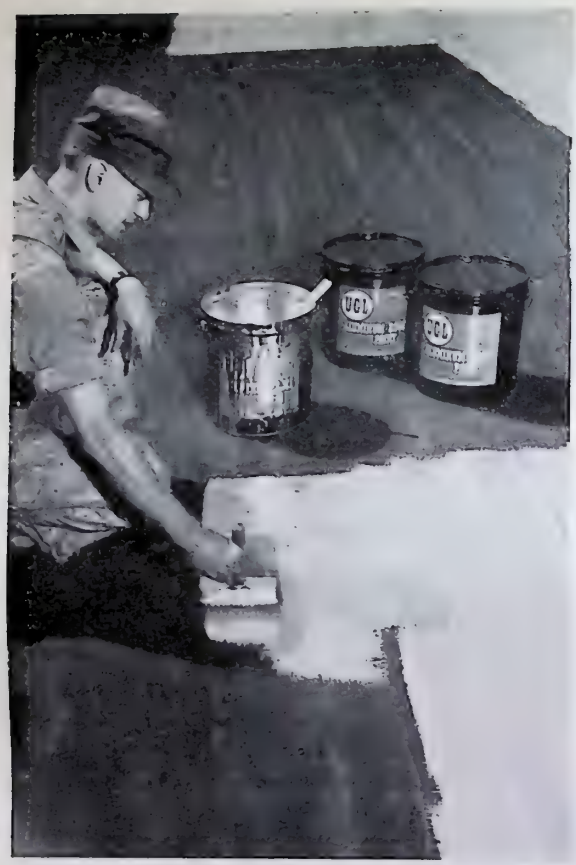
"This will be even more true of managers of theatres in small rural communities, particularly those in the south where intense summer heat has always been a disturbing element to theatre-goers."

THE PAINT'S PROPERTIES

More than a quarter century of scientific research went into the cooling coating which forms a foil-like metallic

HERE IS HOW HOT the exterior of your theatre may get during August, as shown by a United States heat map showing the average daily maximum temperature during that month, based on the 20-year records of about 600 Weather Bureau stations. Daytime peak temperatures will register 80 to 110 in 90 per cent of the country. One-fourth of the United States will average 95 degrees, and nights will be sleepless. Newest umbrella provided by science to shade the exteriors of structures is a new gilsonite aluminum roof paint which deflects about 80 per cent of the sun's rays, and so reducing the interior temperatures by 15 degrees or more.





THE NEW GILSONITE ALUMINUM ROOF PAINT provides low cost insulation, year-round weather-proofing, and summer heat reduction for theatres, as well as for other types of structures. One gallon covers 300 to 350 square feet at a cost of spray about a cent a square foot. Paint is applied with an ordinary brush or spray.

THE ROOF OF THE CREST THEATRE, Long Beach, New York, receives the last of its coat of gilsonite aluminum roof paint. The painter, his 6-inch roofing brush, 15 gallons of the liquid insulation, and less than 8 hours of working time were all that were required to give 4,900 square feet of roof area its new protection.

shield against the elements and more particularly against the ultra-destructive ultraviolet rays of the sun.

United Gilsonite Laboratory technicians point out that the secret of the new paint is the gilsonite base, a natural asphalt that is 99.5 per cent pure. Gilsonite was discovered by S. H. Gilson in Utah where it is still mined exclusively. Gilsonite is not only nature's most lasting, purest, and choicest of asphalts, but it is also known to be the most effective material for resisting the destructive action of both acids and alkalies. It also remains completely unaffected by water.

This miracle bitumen coupled with the quantity and purity of aluminum pigment used, imparts an extra stability and inertness to the roof coating and extends its life.

The pigment is a specially processed Alcoa Albron aluminum paste and is used in excess of 2 pounds to the gallon. Fifty per cent remains on the surface to give protection and insure maximum wear, which is 10 to 15 per cent more than remains with ordinary coatings.

BACKED BY TESTS

The new paint was put to extreme tests before it was announced and distributed nationally through jobbers, paint and hardware dealers.

For one of the test experiments, two identical miniature buildings were constructed. The roof of one was painted with a standard coat of UGL aluminum paint and the other with a standard coat of asphalt paint. Four powerful heat-producing lights were mounted 18 inches above each roof. Thermometers were placed at the base of each group of bulbs, on each roof, and inside each miniature building. At the outset, before the lights were switched on, all six thermometers readings were identical.

After only 1 hour of exposure to the terrific heat generated by the bulbs, the interior temperature of the asphalt coated building had climbed up to 136 degrees while the interior temperature of the aluminum roof painted building was only 101 degrees—a difference of 35 degrees!

A similar experiment was conducted with an ordinary roof shingle. One end of the shingle was given a coat of the liquid insulation while the other remained unpainted.

The shingle was then placed under an ordinary infra-red lamp. After 6 minutes of the lamp's concentrated heat, the unpainted surface had begun to completely disintegrate while the painted end remained unaffected.

USE AND COST

The paint can be easily and quickly applied with a spray gun or, as in the Long Beach theatre operation, a paint brush. The paint dries within 1 hour and the surface may be used in 3 to 4 hours after application.

The paint is packaged in ready-to-use quart, gallon, and five-gallon containers. It requires no thinning, no mixing—and requires no skill to apply.

Versatility is one of the paint's greatest assets as it can be used on smooth or slate roll roofing, asphalt shingles, non-porous masonry, built-up, metal or slag roofs. (The loose dirt must be removed before application, however.) It is also prepared for outside work such as tanks, flashings, iron fences, etc.

The economy angle is equally appealing. One gallon covers approximately 300 to 350 feet—at a cost to the consumer of about one cent or less per square foot. This is only 1/33 the cost of certain other types of insulation, and only one coat is necessary to do the job.

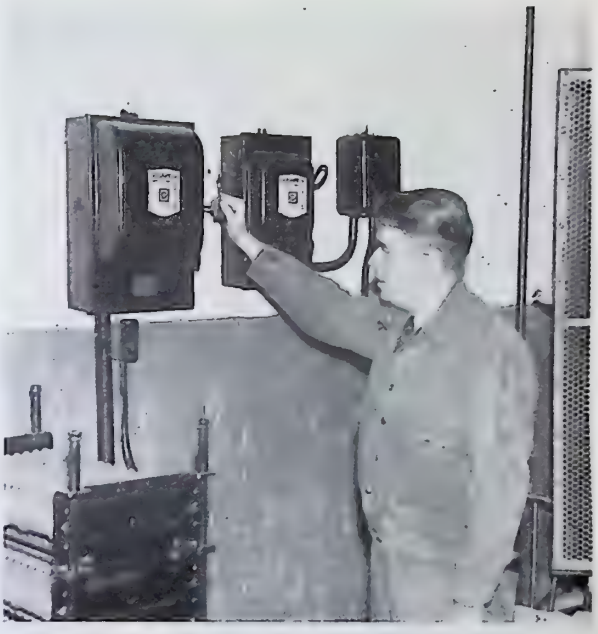
SUMMARY

In the belief that people who pay to be entertained want to be cool in the process, the United Gilsonite Laboratories have offered their new liquid cooling agent, which has been proven a practical time, money, and discomfort saver to the theatre industry.

Seasonal Inspections of Air Conditioning

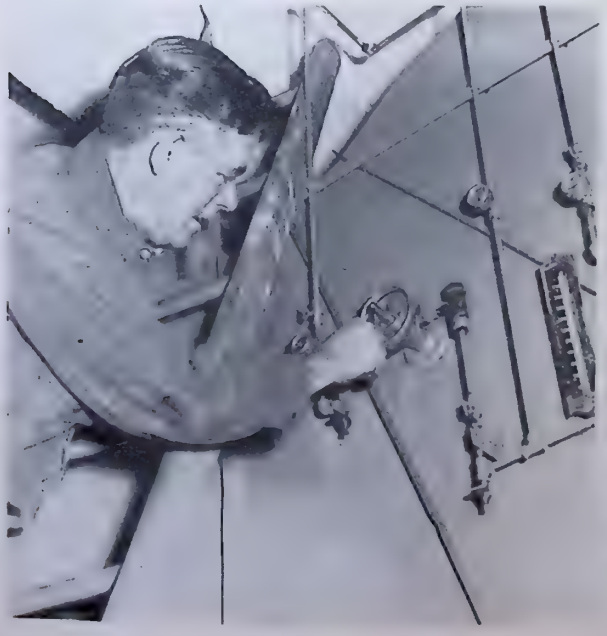
A Picture Commentary on the Maintenance Ensuring Greater Service from Equipment

BELTS ARE INSPECTED for general condition, proper tension, wear, and tear. Especial attention is given to belt lacings and pulleys, for cracks or roughened spots. Seen here is the drive for the main-supply fan having a capacity of 80,000 cubic feet a minute. Check is also made of idler pulleys. The pictured inspector here is Phillip Fitzpatrick, chief engineer at the Mastbaum Theatre, Philadelphia.

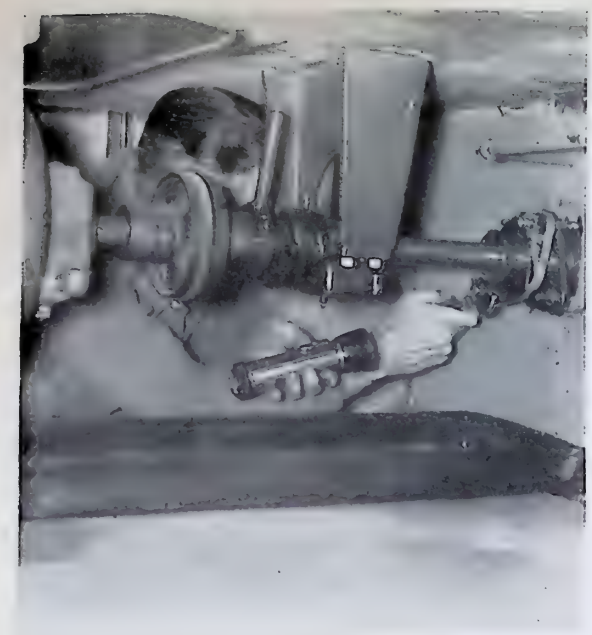


SWITCHES, AND OTHER ELECTRICAL EQUIPMENT, such as solenoids, safety circuit breakers, and the like, are checked visually for freedom of movement, the absence of any corrosion, and for worn parts. When the serviceman finishes the job, all this equipment moves freely, with all worn parts repaired or replaced with new ones, and all traces of corrosion eliminated. Controls are the keys to efficiency.

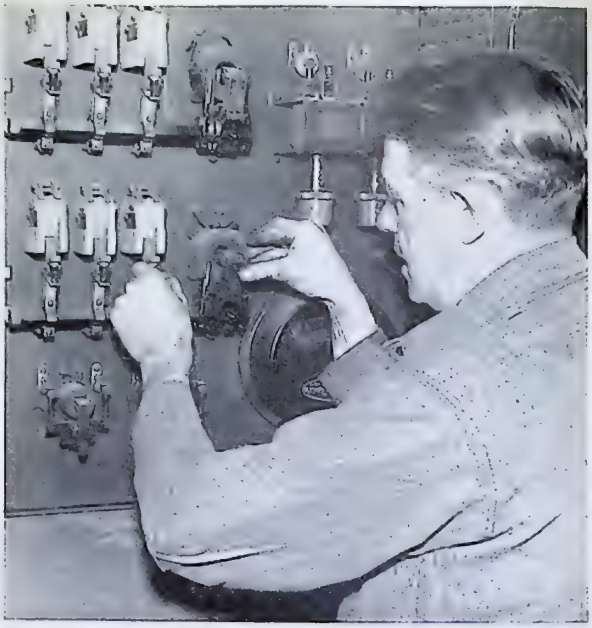
THE THERMOSTAT IS ADJUSTED and checked for accuracy. It is important that the thermostat be checked and adjusted at intervals throughout the operating season of the equipment, since the delicate adjustments of this sensitive control are subject to variations as a result of the constant resetting of the device, depending on weather conditions outside the theatre no less than the extent of crowds inside.



A FEELER GAUGE IS USED to determine the extent of wear, clearance, and proper adjustment on the main bearing of a Carrier centrifugal compressor (size 10-E) of 250 tons capacity. When there has been excess wear on the main bearing, resulting in too much clearance and improper adjustment of the associated parts, intolerable vibrations are apt to be set up, and transmitted to other parts of the machinery.

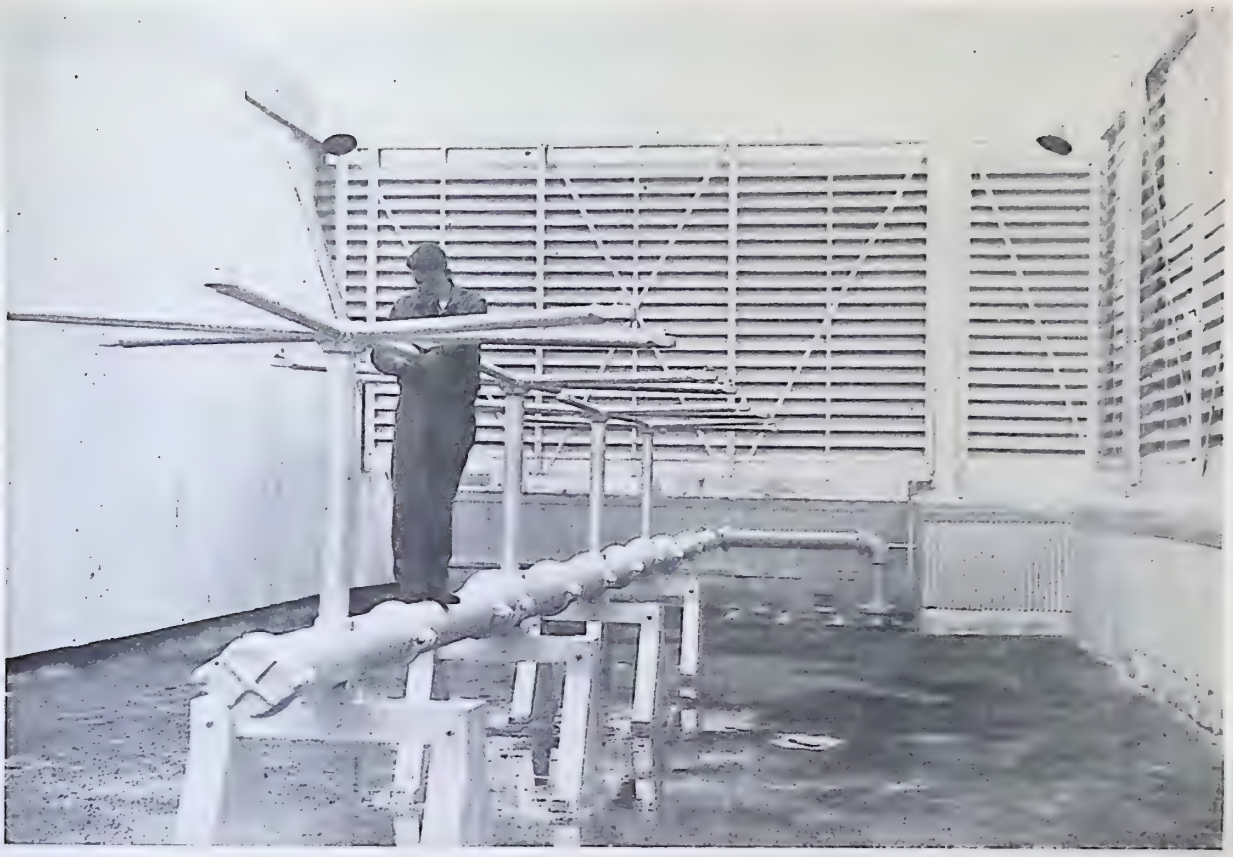


PACKING NUTS THROUGHOUT THE EQUIPMENT are adjusted. Here is the water-circulating pump being adjusted. The serviceman will also check the one packing nut on the liquor circulating pump. This process is, of course, not necessary on small set-ups which have expansion valves. There, however, the valve would have to be thoroughly checked in order to make sure it opens and closes properly.



STARTING THE WATER-CIRCULATING and the liquor pumps for a check-up and run is necessary before the complete system is put into operation for the season. Of course, the old oil has been drained and new oil, of the proper type and viscosity, put in. In this set-up, medium-heavy, DTE oil is used, with 15 gallons being used in the compressor and a like quantity in the gear case. Use the proper oil.

OVER THE AUDITORIUM CEILING and under the roof of the theatre is the duct system that feeds many portions of the house. Here is seen such a spot, and an air duct with a damper control. In the pre-season check-up, all dampers are inspected to insure that their freedom of movement is not hampered by dirt, other types of foreign matter, and particularly, rust. Where any faulty dampers are found, the serviceman cleans up the difficulty — even to replacing the item — if it cannot be put into proper working condition — and leaves the system quite as it was when new. For thorough service, always call for known experts.



UP TO THE ROOF FOR A LOOK at newly painted vertical baffles and the water-cooling system, the serviceman carefully checks the nozzles to make sure that they have not been inadvertently clogged by paint. The vertical baffles are to break the wind which would blow the water away when it is sprayed during a medium high wind. The apparatus pictured here sprays and cools 900 gallons of water a minute. The apparatus for air conditioning is among the most expensive the theatre owner buys and one of his best investments in the house's popularity. Such investment deserves to be protected by only the best service.

DUCTS ARE CAREFULLY INSPECTED for their general condition, and, especially, for the presence of dirt and rust. As it happens this particular duct system was thoroughly cleaned out last year, and accordingly, is in pretty clean condition this year. This is, to you, of course, the plenum chamber. The theatre's duct system should always be kept clean. The outside-air intakes should be frequently inspected.

THE BRUSHES OF ELECTRIC MOTORS are inspected for their length and condition. The commutator is also inspected for wear and roughness, shorting out, and the like. The equipment shown here is a General Electric Company 350-horsepower, variable-speed, induction motor. Electrical equipment should be handled only by those in the know, for inexpert tinkering is apt to lead to more serious repairs.

Summer Care for Theatre Heating Systems

Suggestions Are Set Forth for the Care Of Sectional and Tube-Type of Boilers

There are two types of boilers commonly used for heating—first, the cast-iron sectional boiler, and, second, the steel fire-tube boiler. Heating boilers are often seriously damaged during shut-down periods, due chiefly to corrosion resulting from a combination of suphur from the fuel with the moisture of the cellar air. At the end of the heating season, the following precautions should be taken.

CAST IRON SECTIONAL BOILERS

To obtain satisfactory results, a clean boiler is absolutely necessary. This cleaning is generally best done by your heating contractor. It is recommended that a special boiler cleaner (such as Vinco, made by American Radiator and Standard Sanitary Corporation) be used reasonably soon after installation. (Caution: Do not use soda, or any alkali, vinegar, or acid as a cleaning agent in the boiler.) It is essential to follow instructions of the manufacturer and, in obstinate cases, to obtain the recommendations of their laboratories.

It may also be necessary to blow off the boiler in order to remove foreign matter which affects its performance. This task should be cared for by your heating contractor, who is qualified to do the work in accordance with accepted practice.

Boiler water containing foreign substance wastes fuel and may cause trouble.

Hot-water boilers do not need this treatment.

Before shutting down, it is suggested that you wash out the boiler well with a solution of a recommended cleaning chemical. Dissolve the chemical in a bucket of warm water and introduce this solution into the boiler through either the safety valve or some other convenient connection. Allow this to boil in the boiler for several hours and, on the following morning, blow off sufficient water to take the water level down to the bottom of the glass. This operation should be repeated every day until you find the water coming out of the blow-off is absolutely clear of any sediment or scale.

Remove all ashes and residue from ash pit and fire grates. Examine these grates, and, if found to be burned or warped, notify the maintenance department.

Open all clean-out doors, and thoroughly clean with a good brush the full length of the boilers. Remove all soot.

Clean out the up-take from the boiler to the chimney. There is usually a door here for this purpose. Paint the exterior of this up-take to prevent deterioration.

Open clean-out door at the base of the chimney and remove all soot.

It is good practice to have the boiler attendant go over the heating just before it is shut down and mark any leaky valves and flanges, so that these may be repacked when the system is shut down.

Water-level gauges should be renewed if found to be dirty or leaky. It is essential, when renewing these glasses, that new washers be used. Fusible plugs are installed in the boiler as a safety measure to prevent explosions; it is suggested that these plugs be renewed each year. A report should be made to the maintenance department of all broken parts on a boiler, such as fittings, wheels and valve stems, fire and ash-pit doors, and so forth.

Paint all surfaces of the boiler, which are normally painted, with a heat-resisting paint. Oil the hinges of fire-box and ash-pit doors.

If there is much moisture in the boiler room, it is desirable to drain the boiler to avoid atmospheric condensation on the heating surfaces of the boiler. Due to the hazard of someone inadvertently building a fire in a dry boiler, however, it is safer to keep the boiler filled with water.

The theatre manager should satisfy himself that the boiler has been thoroughly cleaned. Have someone hold a light in the clean-out doors at the rear of the boiler and open the front clean-out doors: thus is it possible to look through the interior of the boiler and see whether the cleaning has been done satisfactorily.

The importance of cleanliness cannot be over-emphasized, as, according to best authorities on this subject, a deposit of 1/32-inch of soot will cause a loss in efficiency of 10 per cent in the operation of the boiler.

STEEL FIRE TUBE BOILERS

The same general rules on cleanliness should be observed in steel fire-tube boilers as in the cast-iron sectional boiler. However, in this type of boiler, the tubes should be thoroughly cleaned with a flue cleaner and the front flue sheet and doors should be brushed down thoroughly with a wire brush. Ash pit, fire box, combustion chamber, and back connection to the stack should be thoroughly cleaned of all soot and other residue. The rear head to the back arch should be swept clean of soot. The inside of the boiler—that is, the heating surface—should be thoroughly cleaned and given a coat of lubricating oil or grease.

Renew the fusible plugs, as explained above.

It is suggested that all brick work be examined to determine whether there are any air leaks in the firebox. Also examine the brick lining of the firebox; it is very important, if any air leaks are found, these be taken care of to prevent fire from attacking the foundation walls of the boiler.

Empty the boiler entirely of water and remove all manhole and hand-hole plates. Wash out the interior of the boiler very thoroughly before replacing the manhole and hand-hole covers. These covers should be scraped clear of any residue and new gaskets installed. It is suggested that the gaskets be covered with a mixture of graphite and oil to prevent corrosion.

If there is much moisture in the boiler room, it is desirable to drain the boiler to avoid atmospheric condensation on the heating surfaces of the boiler.

Due to the hazard of someone inadvertently building a fire in a dry boiler, however, it is safer to keep the boiler filled with water, unless you give instructions that no fire be made and see that they are followed.

WHEN PAINTING METAL SURFACES, as suggested in this article, it should be remembered that similar protection should be given all metal surfaces in the theatre, particulraly where such are located in places almost always subjected to rust-inducing conditions. As shown here air-conditioning equipment and beams should be examined periodically and painted to prevent rust. Much of this type of work can be done as the boilers are checked.

FOR BOTH KINDS

All grates should be thoroughly cleaned and examined, and any burned or warped grates should be reported to the maintenance department.

The connection between the boiler and the chimney should be examined very thoroughly for air leaks. Air leaks are most likely to be found in the joints and in any openings to this part. If found to have leaks, these should be corrected by filling any cracks with fire cement. If you have been experiencing any trouble with poor draft, this should be looked over very carefully. All the air that goes up the chimney should be drawn through ash-pit doors, hence over the fire box. Any leaks which may be in the connection between the boiler and the stack cause the air to short-circuit, thereby reducing the draft necessary to make your fire burn efficiently.

Inspect all accessories of the boiler carefully, to see that they are in good working order. In this connection, all door hinges, damper bearings, and regulator parts which are broken should be reported to the maintenance department.

If the system is equipped with a vacuum pump, this equipment should be carefully examined; see that the motor is cleaned, if necessary repack the glands on the pumps with a good grade of packing, remove all strainers in this equipment, and give them a thorough cleaning, replacing the wire mesh, if broken; give the pump and the receiver tank a coat of paint, and then cover this equipment until it is to be put into use again.

The burning of rubbish in a boiler which has been shut down for the summer causes considerable trouble, as smoke may permeate the theatre. The burning of rubbish, papers, and so forth in boilers certainly does not help boilers any. If rubbish and the like must be burned, the following rules should be observed:

See that there is water in the boiler. If there is more than one boiler in the plant, choose the one nearest the chimney, and use this one for burning rubbish, papers, and so forth. Close all dampers on the other boilers, and open all the drafts on the one being used. This will allow the chimney to draw from this boiler only. If there is only one boiler in the plant, and paper and the like are to be burned all dampers should be left wide open.

Rubbish should be burned outside of operating hours. it should be burned every day, and, in this way, a small quantity is burned at a time with very little trouble. To set fire to a mass of paper, and so forth, which has been jammed for days and weeks into the fire box of a boiler which has been shut down will only result in clouds of smoke which are bound to fill the house, the chimney and the boiler being too cold to create enough draft to draw in sufficient air to ignite the mess.

Remember, if you are burning rubbish, papers, and the like every day, you must keep your boiler clean. Ashes must be removed regularly from the grates and ash pit. At best, the draft from a cold boiler and chimney is not very good. If a foot or so of ashes is allowed to accumulate on grates, it is still further cut down.

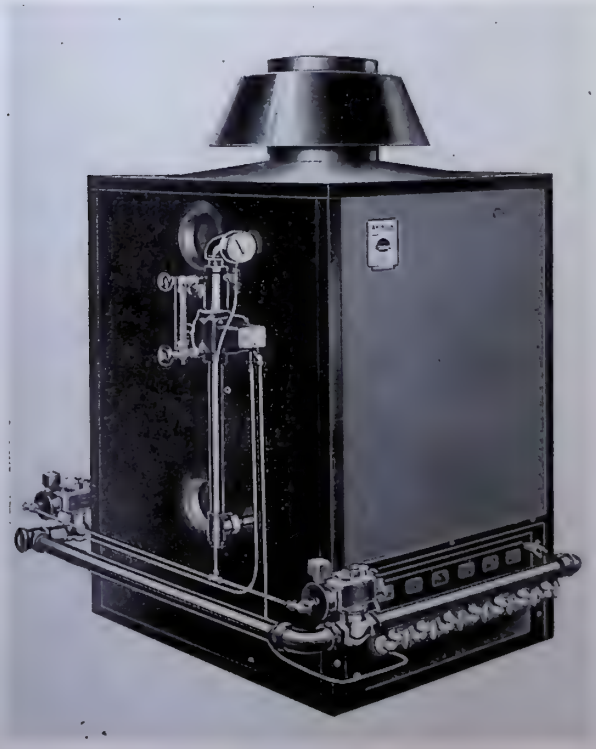
Last, but by no means least, clean up the boiler room, arrange ash barrels, coal bunkers, fire tools in an orderly way. Neatness and systematic methods promote safety and efficiency in the boiler room just as certainly as they do in other places. Your boiler and heating equipment perform an important and necessary duty. Satisfactory ,and economical results are largely dependent upon the care and attention given to it. Allow dirt and ashes to accumulate in and around the boiler room, allow water to flood same and you will have the same sloppy results with your heating.

Take all steam traps apart before the heating season starts and see that they are clean. Inspect all your valves throughout on the main steam lines, branch lines, and radiators, and repair if necessary.

All radiator valves on a steam system should be left open and water allowed to return to the boiler. There is usually a draw-off valve on the lowest point of the return lines at the rear of the boiler for the purpose of draining water out of the heating system. This valve should be opened, and all the rusty, dirty water that lodges in the lower points of the heating system allowed to drain off.

Oil burners and pumps should be gone over. All parts should be washed in kerosene. Worn and broken parts should be replaced. If burner has not been working correctly, an expert on this type of burner should be called to look it over. It is foolish economy to try and run with a poor burner.

THE STANDARD GAS BOILER, Type 4-G of the American Radiator and Standard Sanitary Corporation, is pictured here. Depending on the size of the theatre to be heated, the Type 4-G can be used singly or in battery. The boilers represented in these pictures are of the cast-iron type, whose maintenance is herein described.



REPRESENTATIVE OF OTHER EQUIPMENT for theatre heating is this water tube boiler, Model No. 36, manufactured by the American Radiator and Standard Sanitary Corporation—for use with either coal (hand-fired or stoker) or oil. The boiler is also used singly or in battery, depending on the size of the theatre to be heated.

Is YOUR Theatre Air-Conditioning . . .

A FAILURE . . .

A theatre installs air-conditioning, heating or ventilating systems for patron comfort . . . and to *build box-office!*

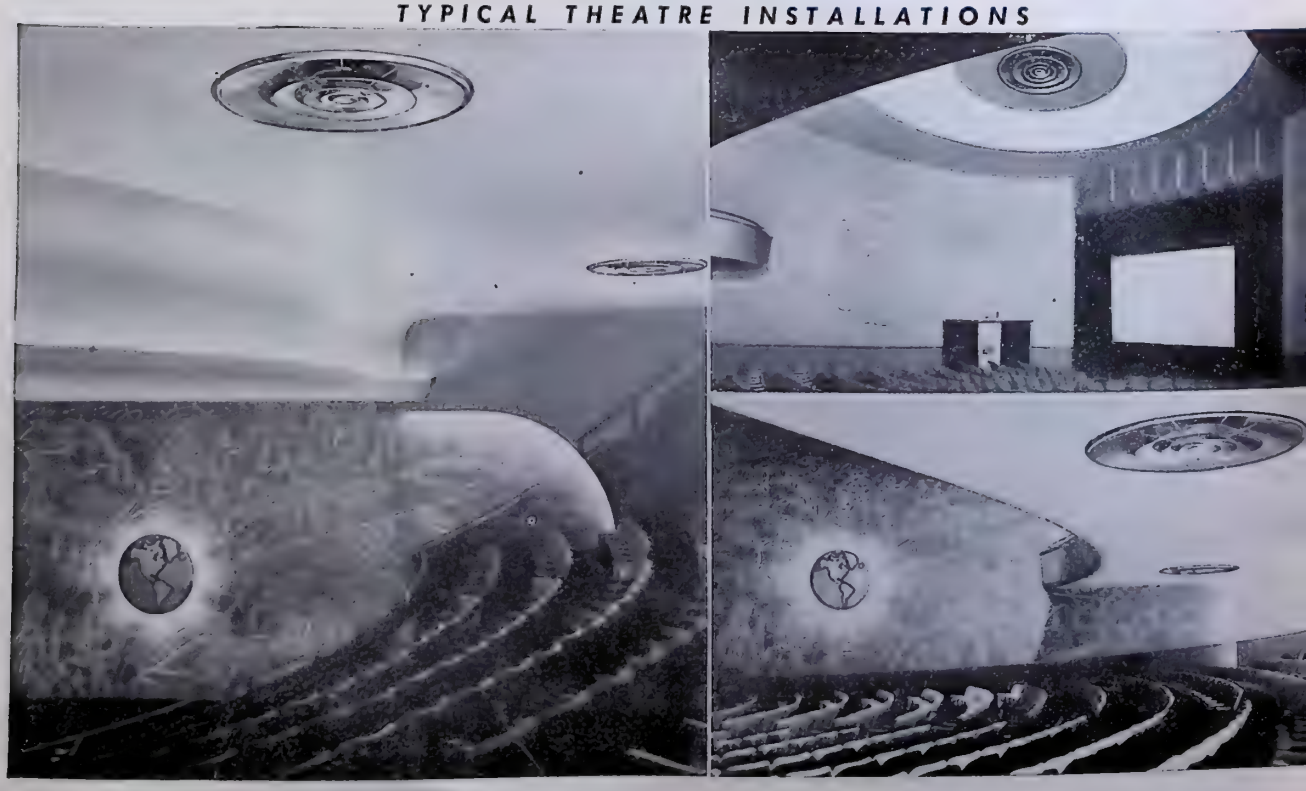
The first requirement is to provide patrons with atmospheric conditions that are conducive to human health and comfort. If theatre patrons feel drafts . . . if there are pockets of dead, stale air . . . if the air is clammy or sticky . . . if it is too warm in some portions and too cool in others . . . if any or all of these undesirable conditions exist — then obviously, "The System Is A Failure" — and *box-office suffers!*

If, on the other hand, draftless, comfortable, healthful atmospheric conditions are constantly maintained, "The System Is A Success" — and *that builds box-office!*

You can be certain of such results through CORRECT AIR-DISTRIBUTION. See to it that every air-supply outlet in your theatre is equipped with

ANEMOSTAT . . .
The Draftless Air-diffuser

TYPICAL THEATRE INSTALLATIONS



or a SUCCESS?

WHAT ANEMOSTATS DO

WHY ANEMOSTATS CANNOT FAIL

HOW ANEMOSTATS REDUCE COST

ANEMOSTATS diffuse conditioned air in such a way that drafts are positively eliminated. They maintain uniform temperatures in every part of your theatre. There are no hot or cold spots, no pools of stale air. Because of the even temperatures, uniform humidity is likewise maintained — hence, no uncomfortable, clammy or sticky spots.

Their design is based solely on the scientific laws governing air in motion. Furthermore, they have no moving parts and nothing can get out of order — they go right on performing indefinitely. They require no attention, no maintenance expense, no replacement.

The cost of equipping a theatre with ANEMOSTATS is only a small fraction of the substantial investment required to install air-conditioning, heating, or ventilating systems . . . but ANEMOSTATS protect systems from failure due to improper air-distribution. Furthermore, in many cases of new installations the use of ANEMOSTATS makes possible substantial savings by permitting smaller air-ducts to be used. There are other important economies we can tell you about.

Write today for bulletin

The performance of the ANEMOSTAT is unique — it has no equal! And ANEMOSTATS can be easily applied to either new or existing systems. We are pleased to place our specialized knowledge at the disposal of your architect or engineer.

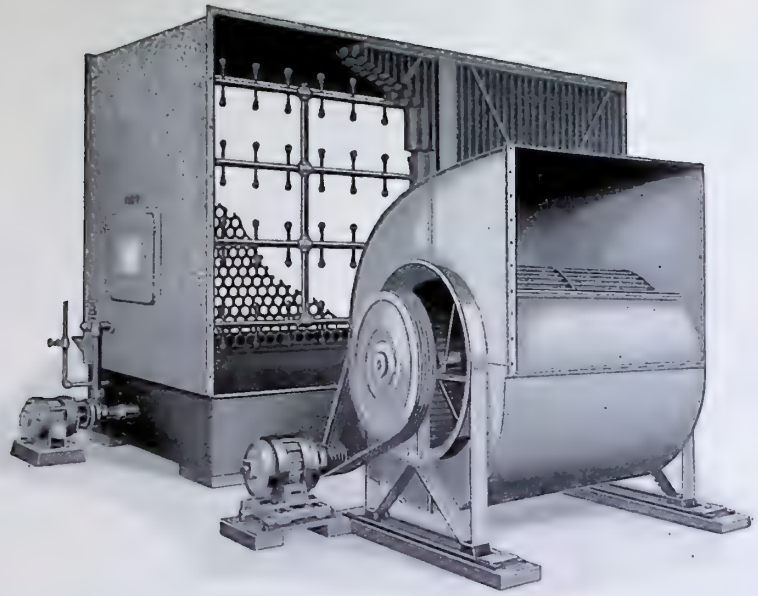
ANEMOSTAT

ANEMOSTAT CORPORATION OF AMERICA
10 EAST 39th STREET NEW YORK 16, N. Y.

"NO AIR-CONDITIONING SYSTEM IS BETTER THAN ITS AIR-DISTRIBUTION"

AC-1040

National Comfort Cooling Equipment



SELECTION CHART

FAN—CLASS I THEATRE AIR WASHER—SPRAY PUMP AND MOTOR COMBINATIONS

SYSTEM	FAN DATA							AIR WASHER DATA			SPRAY SYSTEM AND PUMP DATA									
						Motor					For Lowering the Dry Bulb Temperature of the Entering Air 60% of the (†) Wet Bulb Depression.					For Lowering the Dry Bulb Temperature of the Entering Air 70% of the (†) Wet Bulb Depression.				
C.F.M.	Fan Size	O.V.	* R.P.	RPM	BHP	HP	RPM	Size Washer Class I	Number of Nozzles	Free Area Sq. Ft.	G.P.M.	Head in Feet	Size Pump	Pump RPM	Pump Motor	G.P.M.	Head in Feet	Pump Size	Pump RPM	Pump Motor
11000	100	2000	.44	348	1.93	3	1750	101	60	35.75	60	40	1½x1½	1740	1½	70	45	1½x1½	1740	1½
17000	101	2000	.62	309	3.56	5	1750	101	60	35.75	65	45	1½x1½	1740	1½	75	55	1½x1½	1740	1½
20000	105	1370	.75	235	4.02	5	1150	101	60	35.75	70	50	1½x1½	1740	2	84	65	2x2	1740	2
25000	105	1715	.51	209	4.20	5	1150	105 A or B	96	62.4	96	40	2x2	1740	2	112	45	2x2	1740	3
30000	105	2050	.62	234	6.60	7½	1150	105 A or B	96	62.4	104	45	2x2	1740	2	130	60	2x2	1740	3
35000	108	1600	.76	195	7.20	7½	1150	105 A or B	96	62.4	110	50	2x2	1740	3	138	70	2½x2	1740	5
40000	108	1830	.55	178	7.40	7½	1150	108	144	93.5	150	45	2x2	1740	3	175	60	2½x2	1740	5
45000	108	2060	.62	194	9.82	10	1150	108	144	93.5	162	50	2x2	1740	3	202	70	3x2½	1740	7½
50000	108	2290	.71	211	12.82	15	1150	108	144	93.5	175	60	2½x2	1740	5	223	80	3x2½	1740	7½

From P. 2—Bulletin A23029. Supplement to P. 16—Bulletin A22029.

C.F.M.—Cubic feet of air per minute.

O.V.—Outlet velocity at fan discharge in feet per minute.

(*) R.P.—Resistance pressure in inches of water gauge. (Includes ¼ inch water gauge over requirements for overcoming duct and other resistance.)

R.P.M.—Revolutions per minute.

B.H.P.—Brake horsepower.

G.P.M.—Gallons of water per minute.

Head in Feet—Pressure against which pump operates when handling the required capacity of water.

(†) Wet Bulb Depression—is the difference in degrees (F.) between the dry bulb temperature and the wet bulb temperature of the air. In most localities, it is desirable to select the pump and motor for lowering the dry bulb temperature of the entering air 60% of the wet bulb depression, to provide the most comfortable conditions in the theatre without over-humidification.

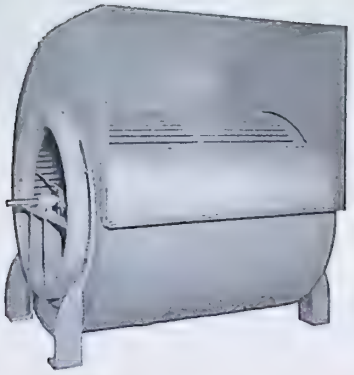
In climates such as encountered at Denver, Colorado, where the humidity is ordinarily low, the pump and motor can be advantageously selected for lowering the temperature of the entering air 70% of the wet bulb depression.

Write for Forms 1129-22-23-24 for Complete Details.

NATIONAL THEATRE SUPPLY
Division of National • Simplex • Bludworth, Inc.

A UNIT OF NATIONAL STANDARD THEATRE EQUIPMENT

National Fans and Air Washers



THEATRE FANS

1. Designed and built especially for theatres by the world's foremost manufacturer of cooling, heating, ventilating, conditioning and allied equipment.

2. Ratings are certified and are in accordance with the standard test code for centrifugal and propeller fans adopted jointly by the N.A.F.M. and A.S.H. & V.E.

3. Operates at a lower speed for a given capacity than any other type of fan.

4. For a given speed it delivers more air per revolution than any other type fan.

5. It is economical in power consumption, quiet in operation, smooth in performance, durable, and occupies a minimum amount of space.

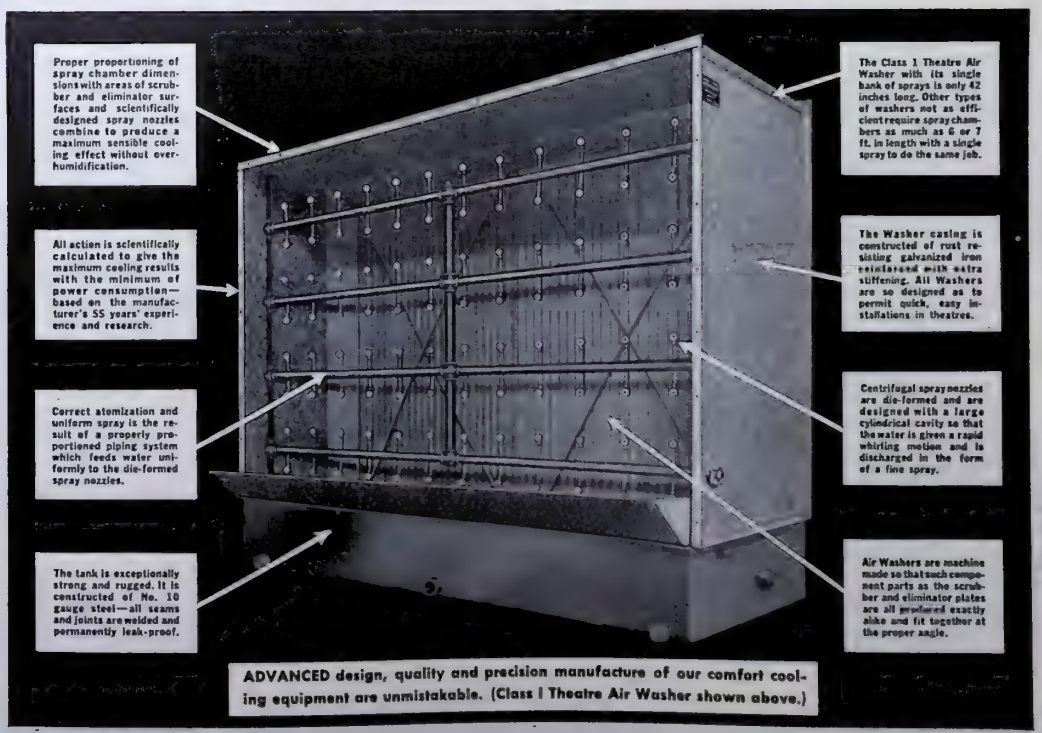
6. THE NATIONAL THEATRE SUPPLY FAN is rugged and strong but light in over-all weight.

THREE WAYS TO COMFORT

1 AIR IN MOTION—For the refreshing, cooling effect of an ample, circulating supply of fresh, outdoor air, NATIONAL THEATRE SUPPLY FANS are the first step in comfort cooling. They are designed and built especially for theatres . . . smooth and quiet in performance, durable, compact, and capable of moving tremendous quantities of air, year in and year out.

2 WASHED AIR—NATIONAL THEATRE SUPPLY CLASS I AIR WASHERS cleanse, purify and freshen the air, remove bacteria-laden dust and water-soluble odors, and have a remarkable cooling effect (by evaporative cooling). Air is brought into intimate contact with water, then sweeps through the theatre like the fresh breeze that follows a rain. Additional cooling effect is provided when cold "well water" is used. (See cooling by "chilled" air, below.)

3 "CHILLED" AIR—NATIONAL THEATRE SUPPLY CLASS II AIR WASHERS (Dehumidifiers) give remarkable Comfort-Cooling effect when "well water" 55° F. or colder is available. Utilizes the cooling effect of the cold "well water," and also washes water-soluble dust and odors from the air. Used with your present or new National Theatre Supply Fan, the Class II Washer provides tremendous quantities of clean, moving, "chilled," nature conditioned air. If you have "cold water" in limited quantities, it can be used in combination with recirculated city water, either with the Class II Washer or Class I Washer.


Proper proportioning of spray chamber dimensions with areas of scrubber and eliminator surfaces and scientifically designed spray nozzles combine to produce a maximum sensible cooling effect without over-humidification.
All action is scientifically calculated to give the maximum cooling results with the minimum of power consumption—based on the manufacturer's 55 years' experience and research.
Correct atomization and uniform spray is the result of a properly proportioned piping system which feeds water uniformly to the die-formed spray nozzles.
The tank is exceptionally strong and rugged. It is constructed of No. 10 gauge steel—all seams and joints are welded and permanently leak-proof.
The Class 1 Theatre Air Washer with its single bank of sprays is only 42 inches long. Other types of washers not as efficient require spray chambers as much as 6 or 7 ft. in length with a single spray to do the same job.
The Washer casing is constructed of rust resisting galvanized iron reinforced with extra stiffening. All Washers are so designed as to permit quick, easy installations in theatres.
Centrifugal spray nozzles are die-formed and are designed with a large cylindrical cavity so that the water is given a rapid whirling motion and is discharged in the form of a fine spray.
Air Washers are machine made so that such component parts as the scrubber and eliminator plates are all produced exactly alike and fit together at the proper angle.

ADVANCED design, quality and precision manufacture of our comfort cooling equipment are unmistakable. (Class I Theatre Air Washer shown above.)

A UNIT OF NATIONAL STANDARD THEATRE EQUIPMENT

NATIONAL THEATRE SUPPLY
Division of National • Simplex • Bladworth, Inc.

ELECTRO AIRE

Now, the air in your theatre can be as odor-free, clear and refreshing as a mountain breeze

THE FIRST ELECTRO-MECHANICAL MEANS OF POSITIVELY AND COMPLETELY ELIMINATING ODORS

Can be installed independently or connected into the recirculated air ducts of your present ventilating system.

Remotely controlled at will from any convenient point to meet all conditions of traffic flow and odor intensity.

REDUCES HEATING AND COOLING COSTS
OPERATING COST ONLY 5¢ PER DAY

NO REFILLS **NO CHEMICALS** **NO EXTRAS TO BUY**

Your first cost
is practically your last cost

THE ELECTROAIRE CORPORATION
41-38 37TH Street Long Island City 1, N.Y.

Central Plant Ozone Equipment for Theatres

NOW ELIMINATES A TROUBLE-SPOT IN THEATRE OPERATION

Electro-aire installations in theatres, restaurants, hotels, garages and many industrial plants for 40 years have been conquering the worst odors.

WHAT IS OZONE?

Ozone is a form of oxygen having three atoms to the molecule instead of two, as in common oxygen. It is a very active and powerful oxidizing agent. Its chemical symbol is O_3. In very small quantities, such as one part in twenty million, ozone gives air a delightful, stimulating quality of freshness such as prevails at mountain tops and at the seashore; and is conducive to mental alertness.

HOW IS IT FORMED?

Ozone is formed in nature by electrical discharges from lightning and from the ultra-violet rays of the sun. Mechanically, ozone is produced by the discharge of a high potential current between two cylinders in an air gap between the two.

HOW DOES OZONE AFFECT ODORS?

Ozone attacks various odors and organic wastes and reduces them to innocuous compounds that are odorless, for it instantly oxidizes the animal and other organic material upon contact with it.

Model L-8 is designed for theatres not exceeding 1200 seats. Model L-12 for larger theatres

FRESH AIR SELLS SEATS

The cost of installing Electro-aire is paid for quickly in money you may otherwise be losing at the boxoffice because of the odor condition common to theatres.

Engineered so that the flow of ozone is instantly adjusted to the amount required. Sold with a one-year guarantee. Operates on A.C., or, by adding a converter, on D.C.

For literature, operating information, and name of your nearest distributor, write

THE ELECTROAIRE CORPORATION
41-38 37TH Street Long Island City 1, N.Y.

REDUCE YOUR OPERATING COSTS WITH THE "LITTLE GIANT" PURGER

The "Little Giant" Purger is an essential item and a profitable investment that quickly pays for itself because:

It reduces power costs
It saves expensive refrigerant
It reduces wear and tear on equipment

When non-condensable gases are present in a refrigerant system, it will operate at higher pressures than it would if these gases were not present. Unnecessarily high pressures result in the compressor being subject to:

Higher bearing loads
Higher discharging temperatures
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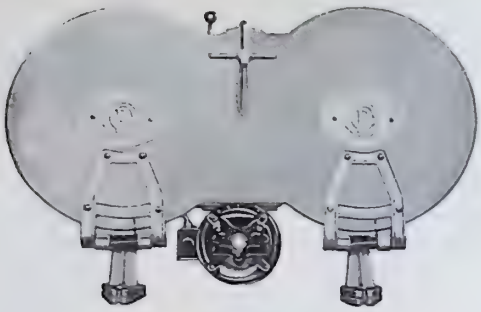

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New Goldberg Rewinder is made of heavy metal, carefully machined . . . doors open on extra heavy counter-balanced spring hinges . . . a large handle keeps the door perfectly tight. A control handle for starting.

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Attractive looking, made of heavy high grade steel, baked enamel crackle finish and aluminum polished top. Made in two styles: G.T.B. has glass baffles and cast iron base. P.T.B. has no glass baffles nor cast iron base. Top has slot for depositing tickets. Not in production. Available as soon as the steel shortage eases up.

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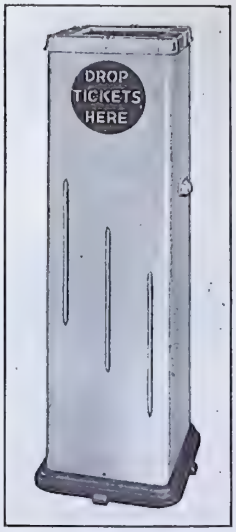

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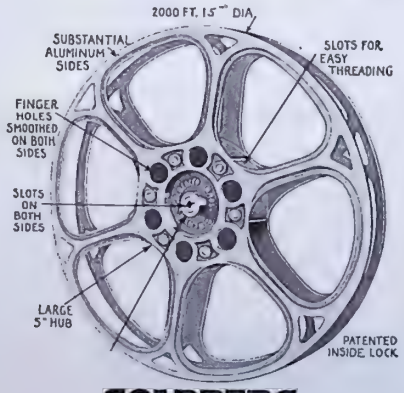
You do away with colds, sore throat and the necessity for leave of absence once you install this efficient speaking tube. It's clever, good-looking and will fit any opening from 2¼" to 4¼". Consists of two rust resisting metal plates, chromium plated, with washers and a screw . . . easy to install.



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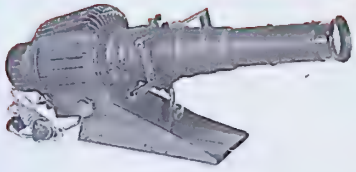

Blower Cooled AIR-FLO STEREOPTON

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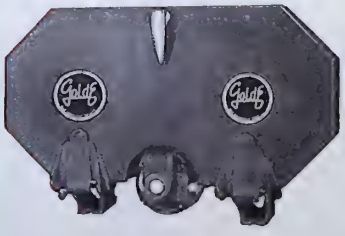

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Handsome Streamlined TICKET BOX

Enhances the appearance of any theatre lobby. Sturdily constructed of 20-gauge steel. Cast aluminum top finished in black baked enamel. Bottom of cast iron. Steel ticket hopper. Piano hinge door. Cylinder lock with 2 keys. Sand blasted glass window in attractive modern design. Scientifically engineered. Chrome handles. Lifetime service. Mar-proof baked enamel finish. Choice of standard colors: Mandarin Red, Royal Blue, or Burnt orange. (Special colors at slight extra cost.)

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Professional-type. Throws powerful beam of clear, brilliant, shadowless white light. Spots down for punchy highlighting or diffuses to even flood with easy, push-pull control. 4½" Fresnel heat-resisting lens. Special guard protects hands. Universal mounting. Perfectly balanced — *easy to handle*. Height 12", length 10", width 6½", weight 8 lbs. Also available in 1000-watt blower cooled model.

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For lighting ideas that are *original,* ask your local G-E lamp representative for a free copy of our new book—MODERNIZING THE THEATRE WITH LIGHT!

And remember the constant aim of G-E Lamp research, which is to make G-E Lamps

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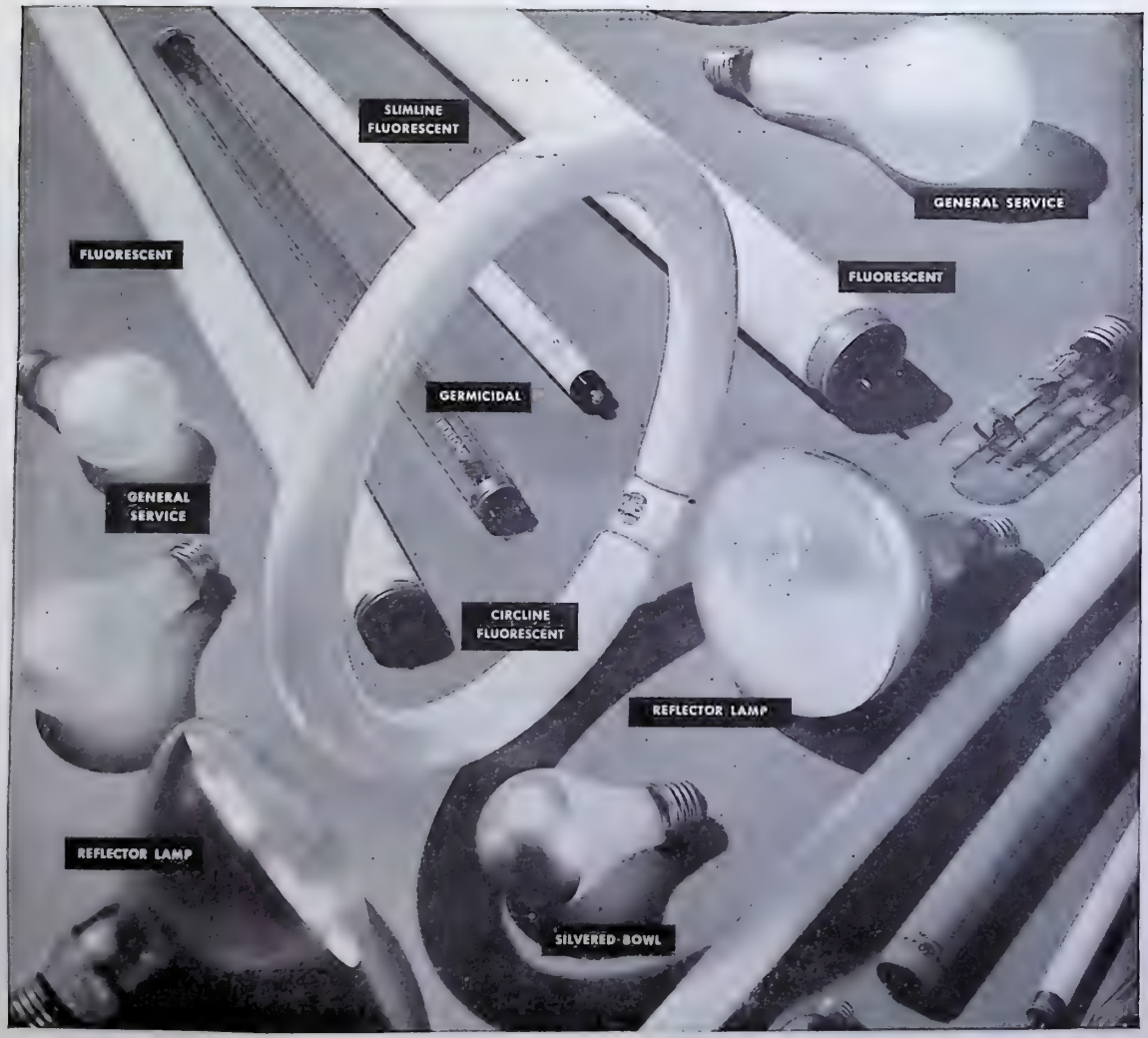
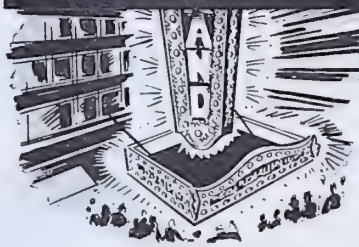


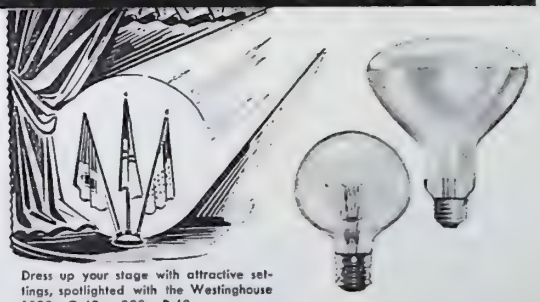
G-E LAMPS

GENERAL ELECTRIC

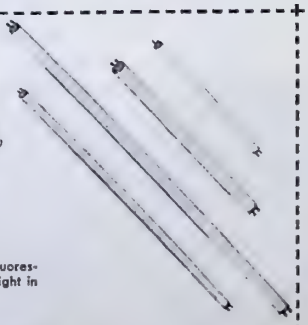
EVERY THEATRE NEEDS Westinghouse LAMPS FOR SEE-ABILITY



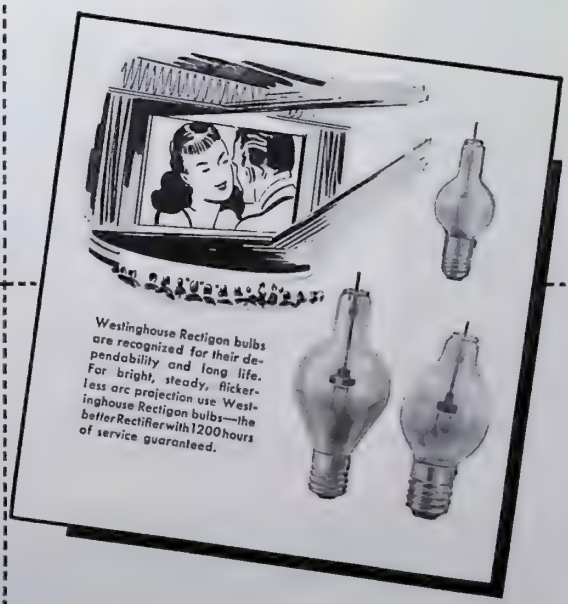
Make your marquee and sign a real attention-getter. Use the standard 10w S 14 inside-frosted for the marquee and the 40w A 21 in clear, red, blue and green for your sign.



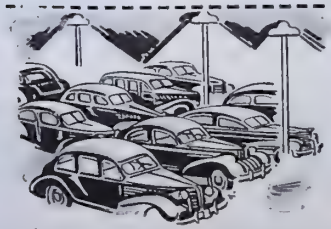
Dress up your stage with attractive settings, spotlighted with the Westinghouse 1000w G 40 or 300w R 40.

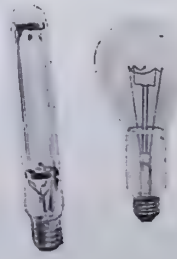


There are plenty of Westinghouse fluorescent lamps available for soft, cool light in the lobby, lounge or rest rooms.



Westinghouse Rectigon bulbs are recognized for their dependability and long life. For bright, steady, flickerless arc projection use Westinghouse Rectigon bulbs—the better Rectifier with 1200 hours of service guaranteed.





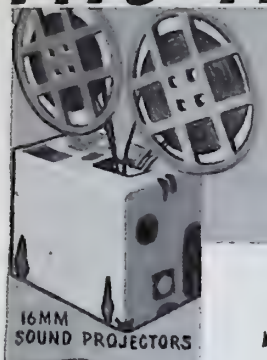
Have your customers park their cars in comfort. Flood light the parking area with tubular Mercury Vapor or 1000w PS 52 incandescent lamps.

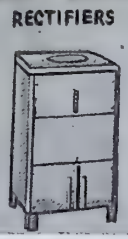
Westinghouse

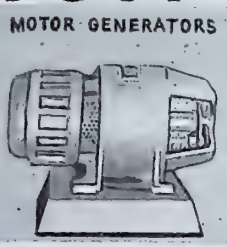
LAMPS FOR SEE-ABILITY

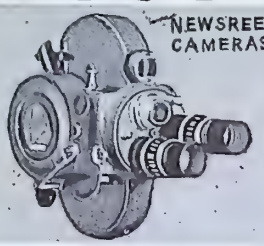
For further information about these and all other types of Westinghouse bulbs consult your nearest Westinghouse Distributor.

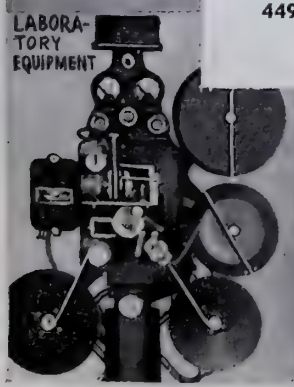
The MOTION PICTURE











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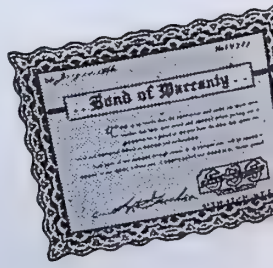

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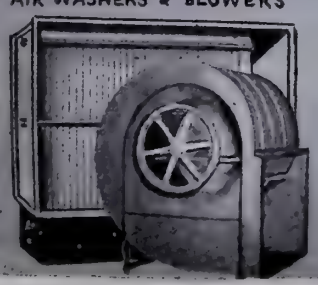

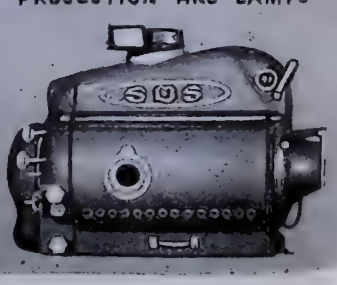

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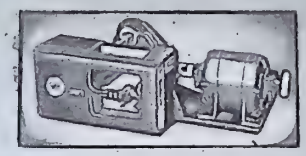

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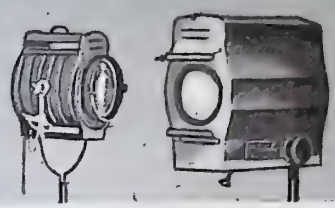

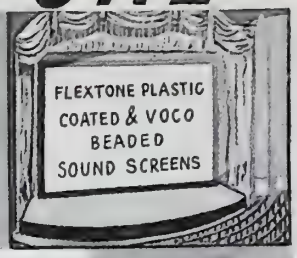

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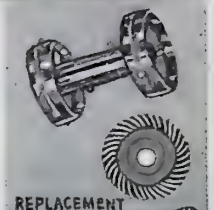

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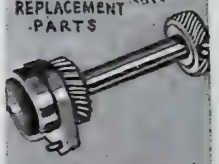
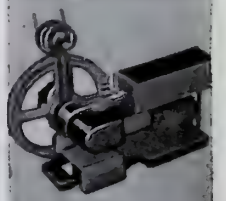


CURTAIN CONTROLS



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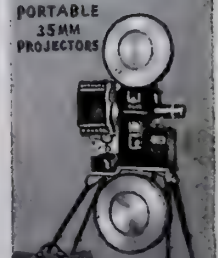

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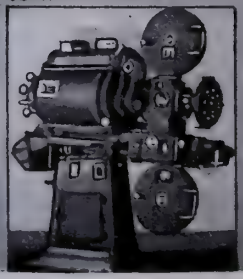

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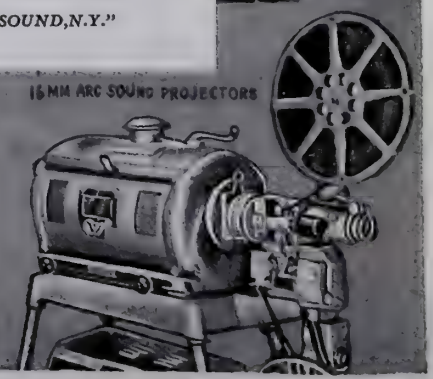

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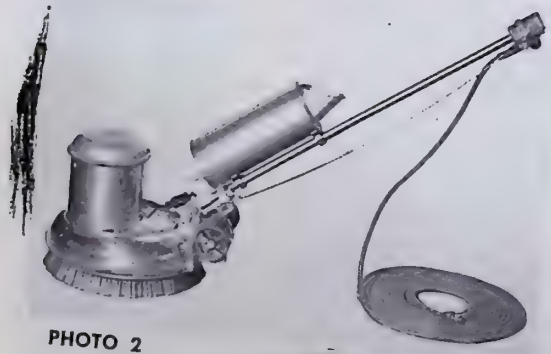

PHOTO 2

PHOTO 3

Even good entertainment is not enjoyed in untidy surroundings. Make your patrons glad they came to a clean, attractive theatre—kept that way with Kent equipment.

PHOTO No. 1 shows the Kent Suction Vacuum Cleaner. Note its rugged, compact, portable construction. Kent Vacuum Cleaners are built to withstand abuse. They can be used with various attachments for complete cleaning of your theatre, including carpets, bare floors, seats, draperies, walls, and air conditioning system.

PHOTO No. 2 shows a Kent Electric Floor Machine, with solution tank attached, for scrubbing the foyer of your theatre. Excellent also for maintenance of stage floors. The Kent does a more thorough job in a shorter time than old-fashioned hand methods. This machine can also be used for steel wooling and polishing all types of hard surface floors.

PHOTO No. 3 shows the Kent Electric Mopper, the easy method of picking up dirty scrub water. The Kent does a clean, fast job, and floors dry quickly. Eliminates dirty baseboards.

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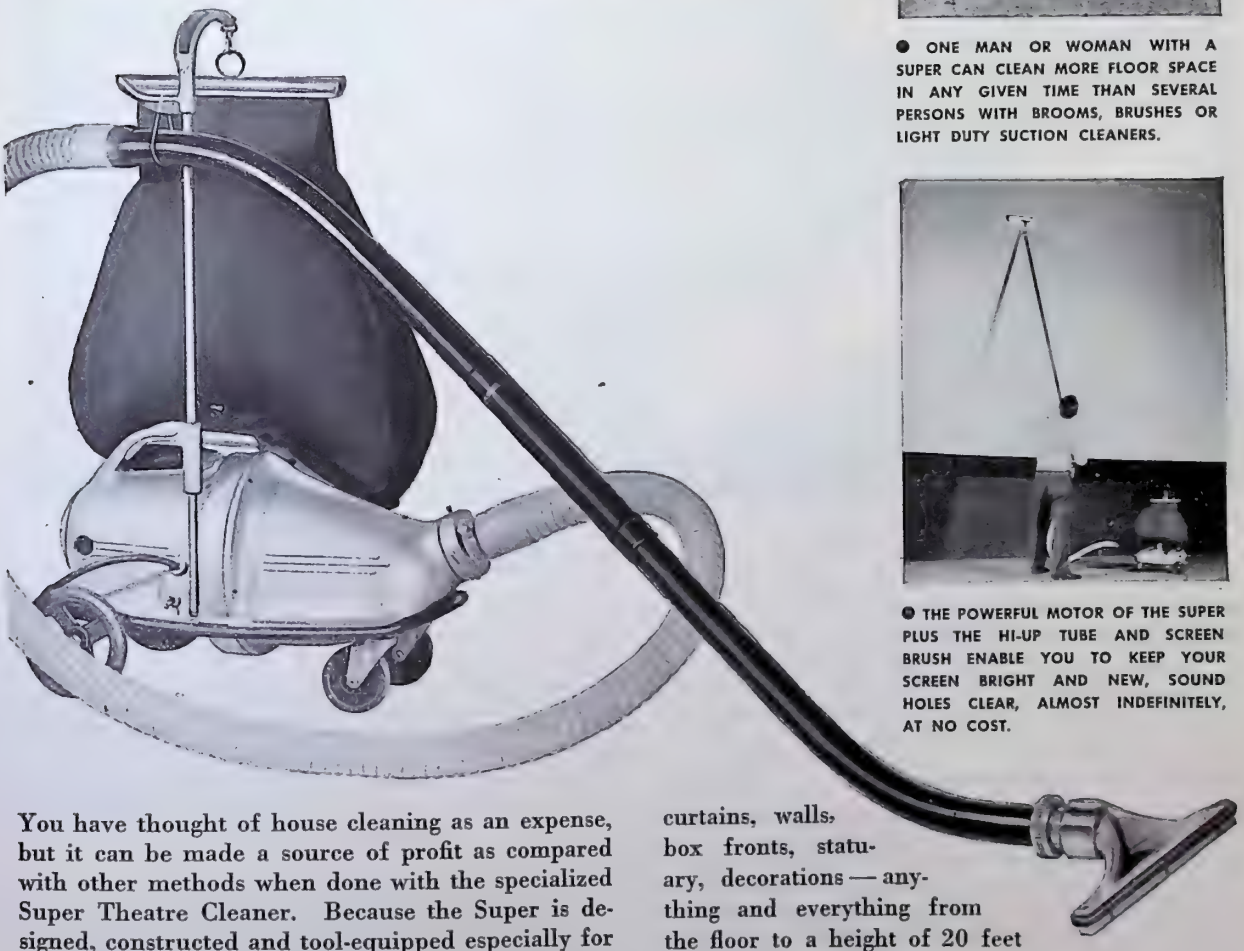

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5 Santarosa St., Athens, Greece

HAWAII

CONSOLIDATED AMUSEMENT CO., LTD.
Hawaii Theatre Bldg., Honolulu
PERSONNEL—J. A. Madden
Products Sold: National Theatre Supply Export Line

ICELAND

G. SIGMUNDSSON
Hafnarstraeti, 19-12, Reykjavik
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

INDIA

EVERGREEN PICTURES
Post Box No. 3515, Bombay 4, India
PERSONNEL—S. N. Kotwal
Products Sold: National Theatre Supply Export Line
COUNTRIES SERVED—India, Burma, Ceylon.

* Listing not confirmed by Supply Dealer

PHOTOPHONE EQUIPMENTS, LTD.
9, Marine Lines, P. O. Box 394, Bombay, India
PERSONNEL—M. A. Fazalbhoy
Products Sold: RCA Export Line, National Theatre Supply Export Line
COUNTRIES SERVED—India, Burma, Ceylon

PICKFAIR PICTURES CORP.
P. O. Box 724, Bombay 1, India
Products Sold: National Theatre Supply Export Line
COUNTRY SERVED—British India

WESTERN ELECTRIC CO. OF INDIA
Metro House, Bombay 2, India
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

PHOTOPHONE EQUIPMENTS, LTD.
98-E, Central Avenue, South, Calcutta, India
Products Sold: RCA Export Line, National Theatre Supply Export Line, Strong Lamps and Rectifiers, International Seats

WESTERN ELECTRIC CO. OF INDIA
Lighthouse Cinema Bldg., Calcutta, India
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

CENTRAL TALKIE EQUIPMENT CO.
703 Chandni Chowk, Delhi, India
Products Sold: National Theatre Supply Export Line

PHOTOPHONE EQUIPMENTS LTD.
Chandni Chowk, Behind Imperial Bank, Delhi, India
Products Sold: RCA Export Line, National Theatre Supply Export Line, Strong Lamps and Rectifiers, International Seats

WESTERN ELECTRIC CO. OF INDIA
3/A Court Lane, Delhi, India
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

WESTERN ELECTRIC CO. OF INDIA
82 Nerbudda Rd., Jubbulpore, India
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

EMPIRE TALKIE DISTRIBUTORS
P. O. Box 644, Karachi, India
Products Sold: National Theatre Supply Export Line

PHOTOPHONE EQUIPMENTS LTD.
Near Denso Hall, Bunder Rd., Karachi, India
Products Sold: RCA Export Line, National Theatre Supply Export Line, Strong Lamps and Rectifiers, International Seats

WESTERN ELECTRIC CO. OF INDIA
Fikree Mansions No. 1, Room 18, Hassa Singhadvani St., Karachi, India
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

PHOTOPHONE EQUIPMENTS LTD.
The Mall, Lahore, India
Products Sold: RCA Export Line, NTS Export Line, Strong Lamps and Rectifiers, International Seats

WESTERN ELECTRIC CO. OF INDIA
48 Lawrence Rd., Lahore, India
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

PHOTOPHONE EQUIPMENTS LTD.
1/18 Mount Rd., Madras, India
Products Sold: RCA Export Line, NTS Export Line, Strong Lamps and Rectifiers, International Seats

WESTERN ELECTRIC CO. OF INDIA
9 Monteith Lane, Egmore, Madras, India
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

IRELAND (EIRE)

WESTERN ELECTRIC CO., LTD.
Veritas House, 7 and 8 Lower Abbey St., Dublin, Eire
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

ITALY

WESTERN ELECTRIC CO. OF ITALY
Piazza Lovatelli 1, Rome, Italy
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

JAVA

WESTERN ELECTRIC CO. OF ASIA
Tanah Abang West 2, Batavia-Centrum, Java, Netherlands East Indies
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

LEBANON

WILLIAM MALLUK
Avenue Allenby, Beyrouth, Lebanon
Products Sold: National Theatre Supply Export Line
COUNTRIES SERVED—Syria, Lebanon

MALAY STATES

SHAW BROTHERS, LTD.
Malayan Theatres, 161 Robinson Rd., Singapore

WESTERN ELECTRIC CO. OF ASIA
46 Orchard Road, Colony of Singapore, Malay Union
Products Sold: Westrex Corp. (formerly Western Electric Export Line)
COUNTRIES SERVED—Malay Union, Netherland East Indies, Siam

MALTA

GENERAL SALES COMPANY
26 Towers Road, Sliema, Malta

MEXICO

***A.E.G. CIA. MEXICANA DE ELECTRICIDAD, S. A.**
5 de Mayo No. 10, Mexico, D. F.

CASA EHLERS
Abraham Gonzalis No. 4, Mexico, D. F.
PERSONNEL — *Owners:* Adriana Ehlers, Dolores Ehlers

EQUIPOS PARA CINES, S. A.
Artes, 13-A, Mexico, D. F.
PERSONNEL—Manuel Ampudia

***GERMAN CAMUS Y CIA**
Belisario Dominguez No. 10, Mexico, D.F.

***GENERAL ELECTRIC, S. A.**
San Juan de Letran y Articulo. Mexico, D. F.

F. MIER Y HNO., S. A.
Paseo de La Reforma No. 72, Mexico, D.F.
PERSONNEL—*Owner and Manager:* Felipe Mier
Products Sold: National Theatre Supply Export Line
AREA SERVED—Mexico, D. F.; Havana, Cuba; Caracas, Venezuela; Lima, Peru

RCA-VICTOR MEXICANA, S. A.
Calzada Villalongin No. 196, Mexico, D. F.
PERSONNEL—*Manager:* John A. Miguel
Products Sold: RCA-Victor Export Line
COUNTRY SERVED — Entire Republic of Mexico

WESTERN ELECTRIC CO. OF MEXICO
Paseo de la Reforma 503, Mexico, D. F.
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

***JULIO G. GARCIA**
Av. Colon 125, Quadalajara, Jalisco

***ALFONSO HERRERA**
Av. 16 de Septiembre 237, Desp. 10, Quadalajara, Jalisco

***ALUMBRADO Y NOVADADES, S. A.**
5 de Mayo Oriente 536, Monterrey, Nuevo Leon

***LAMAR ROUGHTON**
Morelos Oriente 859, Monterrey, Nuevo Leon

***TARNAVA Y CIA**
Padre Mier 215, Monterrey, Nuevo León

***CIRCUITO DEL PACIFICO, S. A.**
M. Escobedo 352, Mazatlan, Sinaloa

***EMIGDIO ALVAREZ**
Mazatlan, Sinaloa

***COMPANIA FOTOGRAFICA YUCATECA**
512 Calle 63, Merida, Yucatan

NETHERLANDS

NEDERLANDSCHE WESTERN ELECTRIC, N.V.
Singel 127, Amsterdam, Holland
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

NORWAY

THE SWEDISH WESTERN ELECTRIC CO., AKTIEBOLAG
Lovenskiolds, Gate 24A, Oslo, Norway
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

THE SWEDISH WESTERN ELECTRIC CO., AKTIEBOLAG
Klostergaden 45, Trondheim, Norway
Products Sold: Western Electric Export Line

NEW ZEALAND

P. C. BLENKARNE, LTD.
Chancery Bldg., 16 O'Connell St., Auckland
PERSONNEL—*Owner:* P. C. Blenkarne. *Manager:* J. C. Spooner
Products Sold: National Theatre Supply Export Line
COUNTRY SERVED—New Zealand

WESTERN ELECTRIC CO. (N. Z.), LTD.
Queen St., Auckland
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

WESTERN ELECTRIC CO. (N. Z.), LTD.
Calombo St., Christchurch
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

P. C. BLENKARNE, LTD.
8 Victoria St., P. O. Box 1175, Christchurch
Products Sold: National Theatre Supply Export Line

WESTERN ELECTRIC CO. (N. Z.), LTD.
Empire Theatre, Dunedin
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

WESTERN ELECTRIC CO. (N. Z.), LTD.
Regent St., Hamilton
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

P. C. BLENKARNE, LTD.
Magnus Bldg., Wakefield St., Wellington
Products Sold: National Theatre Supply Export Line

WESTERN ELECTRIC CO. (N. Z.), LTD.
Dental and Medical Supply Bldg., 128 Wakefield St., Wellington
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

* Listing not confirmed by Supply Dealer

PALESTINE

AMPA, LTD.
P. O. Box 636, Tel-Aviv, Palestine
PERSONNEL—*Manager:* M. Kolari
Products Sold: National Theatre Supply Export Line
COUNTRIES SERVED—Palestine and Trans-Jordan

PANAMA

PANAMA RADIO CORP.
P. O. Box 406, Panama City, Panama
PERSONNEL—A. Bletterman
Products Sold: National Theatre Supply Export Line

WESTERN ELECTRIC CO. (CARIBBEAN)
Calle 31, No. 30, Panama City, Panama
Products Sold: Westrex Corp. (formerly Western Electric Export Line)
COUNTRIES SERVED—Panama, Canal Zone

PERU

J. CALERO PAZ, S. A.
Portal de Belen No. 102/14, Lima, Peru
PERSONNEL—Manager: J. Calero Paz
Products Sold: National Theatre Supply Export Line
COUNTRY SERVED—Peru

WESTERN ELECTRIC CO. (ANDEAN)
Edificio Hidalgo No. 150 y 154, Plaza San Martin, Lima, Peru
Products Sold: Westrex Corp. (formerly Western Electric Export Line)
COUNTRIES SERVED—Peru, Bolivia and Ecuador

PHILIPPINE ISLANDS

S. M. BERGER AND CO., INC.
2219 Azcarraga St., Manila

WESTERN ELECTRIC CO. OF ASIA
675 Florentino Torres, Manila
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

SCOTLAND

WESTERN ELECTRIC CO., LTD.
141 Bath St., Glasgow C. 2, Scotland
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

SPAIN

WESTERN ELECTRIC CO. OF SPAIN
Plaza Cataluna 22, Barcelona, Spain
Products Sold: Westrex Corp. (formerly Western Electric Export Line)
COUNTRIES SERVED—Spain, Portugal and Gibraltar

SWEDEN

THE SWEDISH WESTERN ELECTRIC CO., AKTIEBOLAG
Brodragatan 30, Gothensburg, Sweden
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

THE SWEDISH WESTERN ELECTRIC CO., AKTIEBOLAG
Sveavagen 25-27, Stockholm, Sweden
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

SWITZERLAND

ALPINE WESTERN ELECTRIC CO.
60 Viadukstrasse, Basle, Switzerland
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

TASMANIA

WESTERN ELECTRIC CO. (AUSTRALIA), PTY., LTD.
38 Elizabeth St., Hobart
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

TRINIDAD

BRITISH COLONIAL FILM EXCHANGE
P. O. Box 72, Port of Spain, Trinidad
Products Sold: National Theatre Supply Export Line

GENERAL SUPPLIES, LTD.
28 Henry Street, Port of Spain, Trinidad
PERSONNEL—*Manager:* Isaac N. Akow
Products Sold: RCA Export Line
TERRITORIES SERVED—Trinidad, all of British West Indies, including British Guiana

GLOBE THEATRES, LTD.
Port of Spain, Trinidad
Products Sold: National Theatre Supply Export Line

NATIONAL UNION RADIO SERVICE
9 Corniles St., Port of Spain, Trinidad
PERSONNEL—*Owner and Manager:* J. H. Fung
Products Sold: National Theatre Supply Export Line
TERRITORIES SERVED — Trinidad, British Guiana, Venezuela

WESTERN ELECTRIC CO.
67A St. Vincent St., P. O. Box 61, Port of Spain, Trinidad
Products Sold: Westrex Corp. (formerly Western Electric Export Line)
COUNTRIES SERVED—Trinidad, Barbados, Guianas, Leeward and Windward Islands

TURKEY

TURK MOTOR ANONIM SIRKETI
Beyoglu Istiklal Cadesi, Istanbul, Turkey
PERSONNEL—N. Verdi

UNION OF SOUTH AFRICA

AFRICAN CONSOLIDATED FILMS
Box 4552, Johannesburg, South Africa
PERSONNEL—T. Watson
Products Sold: National Theatre Supply Export Line

H. POLLIACK AND CO., LTD.
88 Eloff St., Johannesburg, South Africa
Products Sold: National Theatre Supply Export Line

WESTERN ELECTRIC CO. (NEAR EAST)
96 Main St., Johannesburg, South Africa
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

URUGUAY

CINEMATOGRAFICA GLUCKSMANN, S. A.
Rio Branco 1320-26, Montevideo, Uruguay
PERSONNEL—*Owner and Manager:* Bernardo Glucksmann
Products Sold: National Theatre Supply Export Line
COUNTRY SERVED—Uruguay

VENEZUELA

JOAQUIN MARTI
Mercaderes a Gorda, Caracas, Venezuela
Products Sold: National Theatre Supply Export Line

STANDARD ELECTRIC, S. A.
Apartado 606, Caracas, Venezuela
PERSONNEL — *Manager:* Jose Castaneda
Products Sold: RCA and National Theatre Supply Export Lines
COUNTRY SERVED—Venezuela

WESTERN ELECTRIC CO. (CARIBBEAN)
Cipresas a Miracielos No. 1-1, Caracas, Venezuela
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

WEST INDIES

DE VEER THEATRE CIRCUIT
P. O. Box 3, Aruba
Products Sold: National Theatre Supply Export Line

H. C. ROSE
Kaladan Lady Meade Gardens, Bridgetown, Barbados
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

ANTIGA CO., S. A.
Oficina y Salon de Ventas, Obispo No. 153, Habana, Cu a
PERSONNEL—*Vice-President:* Enrique Antiga
Products Sold: N. V. Philip's Line, Holland

NATIONAL THEATRE SUPPLY OF CUBA, S.A.
Consulado 112, Habana, Cuba
PERSONNEL—P. Saenz
Products Sold: National Theatre Supply Export Line

***J. F. SAN ROMAN**
J. A. Saco 204, Habana, Cuba

WESTERN ELECTRIC CO. (CARIBBEAN)
Industria 307, Habana, Cuba
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

MARCHENA-MORON & CO.
P. O. Box 13, Curacao, N. W. I
Products Sold: National Theatre Supply Export Line
AREA SERVED—Curacao

***AGENCIAS UNIDAS DOMINICANAS, C. POR A.**
Arzobispo Merino 113, Ciudad Trujillo, Dominican Republic

JOAQUIN GINEBRA
Apartado 834, Ciudad Trujillo, Dominican Republic
Products Sold: National Theatre Supply Export Line
AREA SERVED—Dominican Republic

GRENADA THEATRES, LTD.
P. O. Box 270, St. Georges, Grenada
Products Sold: National Theatre Supply Export Line

PALACE AMUSEMENT CO., LTD.
P. O. Box 211, Kingston, Jamaica
PERSONNEL—B. A. Richards
Products Sold: National Theatre Supply Export Line

RENE DIDIER
Fort de France, Martinique
Products Sold: National Theatre Supply Export Line

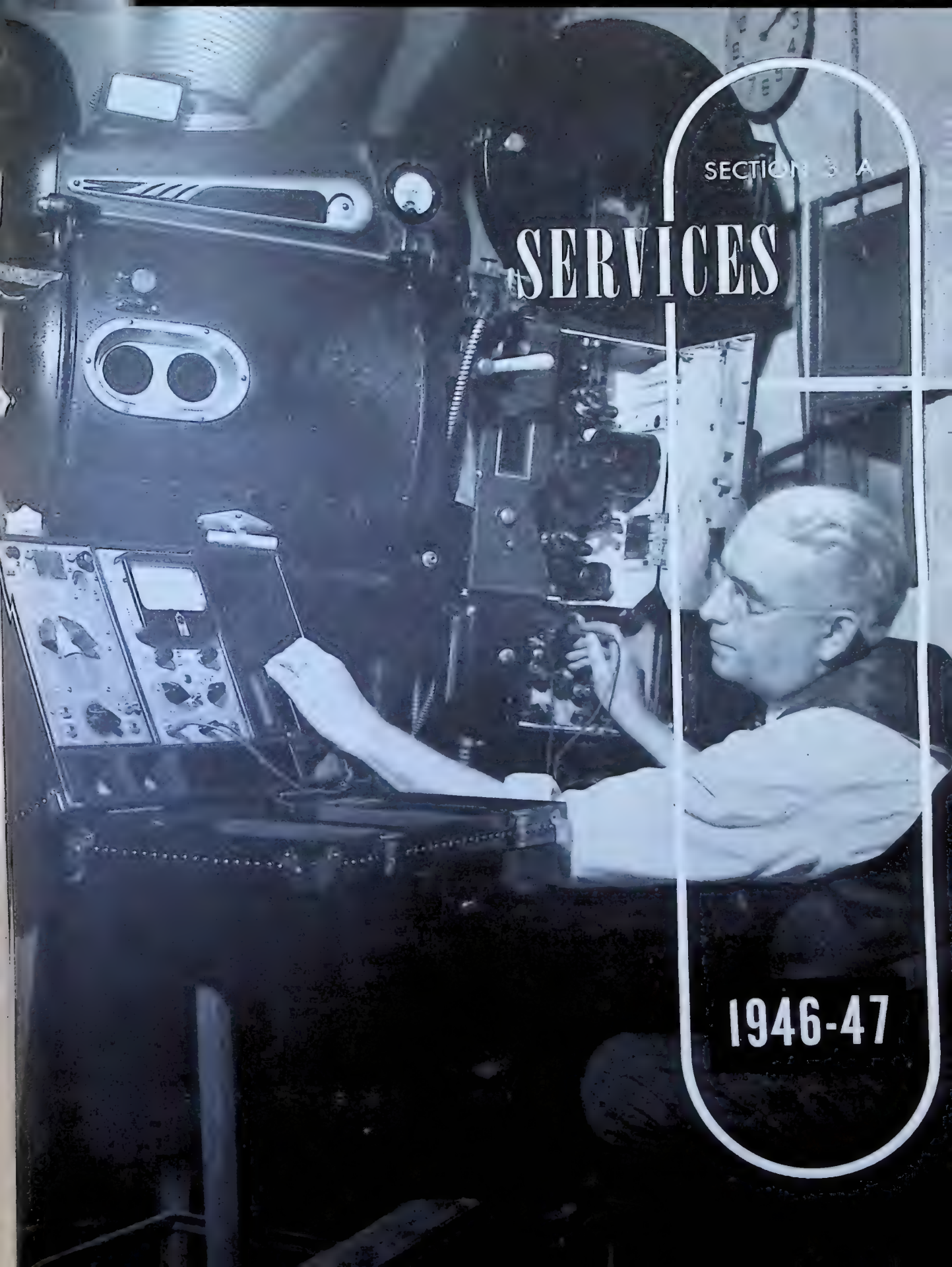
EDUARDO G. GONZALEZ
P. O. Box 3871, San Juan, Puerto Rico
PERSONNEL—*Owner and Manager:* Eduardo G. Gonzalez
Products Sold: National Theatre Supply Export Line
AREA SERVED—Puerto Rico

WESTERN ELECTRIC CO. (CARIBBEAN)
Film Center Bldg., San Juan, Puerto Rico
Products Sold: Westrex Corp. (formerly Western Electric Export Line)

* Listing not confirmed by Supply Dealer

SECTION 3

MANAGEMENT



SECTION 3 A

SERVICES

1946-47

Four New Services for Better Management

Commercial Companies and a Union Present Programs to Better Theatres' Maintenance

Every exhibitor throughout these United States at some time or another has to call specialists to track down and remedy conditions which cause machinery to cease functioning. But all too few there are who take the precautionary measures to insure uninterrupted operation of their equipment.

For example, there is probably no exhibitor who has not put in a rush call to his supply dealer for services of the sound and projection engineer. But as a matter of cold records, authoritative sources declare that only about 53 per cent of all exhibitors in the country subscribe to service contracts—which services include prevention no less than maintenance and replacement—as promulgated by the leading service companies in the projection and sound fields.

If this percentage of subscribing theatres seems unusually low—and, when one considers the number of metropolitan circuit theatres with their own maintenance staffs, it really is not too low—it is most definitely high in comparison with the percentage of theatres going in for maintenance contracts and services on other items of their mechanical equipments.

In the following sections of this article will be described four types of services which the exhibitor should seriously consider from the standpoint of benefit to his theatre over a period of time.

MANY HEADACHES in maintaining air-conditioning systems can be avoided by the smaller theatres by utilizing the services such as are described in this article. Prevention here is more valuable than cure.

AIR-CONDITIONING SERVICE

Perhaps the most expensive items of equipment of the modern theatre are to be found in its air-conditioning system, but because of its less direct effect on the box-office receipts it has been forced to a somewhat lesser level of consideration than the projection and sound equipment.

As the years go by, more and more theatres are coming to install heating, cooling, and air-conditioning plants which, in one phase or another, are operated on a year-'round basis, employing the same air-distribution system for all functions. Hence, an air-conditioning system becomes more than a summer-season consideration, and, important as service was formerly, it is now even more so with the more continued use of the equipment.

Even in metropolitan areas, there are few theatres, save for circuits sufficiently expansive to warrant it, can afford to employ maintenance men, and even the smaller circuits find it on the expensive side.

In many cities, companies specializing in the engineering aspects of heating, ventilation, and air conditionng are establishing maintenance departments, whose services are available for one-shot, seasonal, or year-long servicing agreements.

One such company is the General Maintenance Engineers, of Philadelphia. To understand best the scope of such a company's work, to the end that its potential services may be evaluated against the needs of a particular theatre, it is well to examine the service contract.

In the following paragraphs, the General Maintenance contract is, in part, reproduced, but only as an example of the type of services that are becoming available to U. S. theatremen and the type of services that should receive serious consideration.

Contractual Provisions

Ducts—All duct work, both supply and return and intake (unless specified otherwise), which is a part or portion of the system described above, is to be thoroughly cleaned, covering all interior surfaces of ducts, in the following manner: Agitation, vibration, scraping, vacuuming with specially designed, powerful, portable industrial vacuum equipment, and washed with GME formula No. 1, which is a non-corrosive solution and non-injurious to the metal. The washing process is to be done in an approved manner, not permitting any excess fluid in the ducts, and all ducts to be dried by air after washing. The above specifications are to be construed to mean cleaning ducts down to the base metal.

Accessibility of Ducts—Specially trained men will enter all ducts down to the size of 10 x 12 inches. Ducts of lesser dimensions will be treated as above and snaked.

Access Panels, Doors, and Openings—Access panels will be made in ducts with electric shears, making neat openings in inconspicuous places of ducts. These openings will be covered with metal plates or doors, fitted with asbestos gaskets to insure a tight fit. Plates to be held in place with metal screws. Doors to be reinforced and of double thickness, containing air chamber for insulation and to have two hinges and two window locks.

Access Panels in Fans—In making openings in fans, care will be taken to make openings in such a manner as not to cause dirt, oil or grease in fan to catch fire. Fans will be carefully lubricated and upon request (as an extra) two coats of red lead paint will be sprayed on the interior housing and blades. Openings made in fan will be covered with a plate of heavy gauge metal, designed to fit the contour of the fan housing and held securely in place with metal screws or bolts, and edges fitted with asbestos gaskets, same as paragraph three, to insure a tight fit.

Grilles, Registers, Dampers, and Baffles—All grilles and registers will be carefully removed and thoroughly cleaned and replaced. Where grilles are set in plaster, they will be removed unless otherwise directed. In removing grilles a sharp instrument will be used to cut around the grilles, so as not to impair paint and plaster. We shall not be responsible for any paint retouching or plaster cracking as a result of removing grilles and registers. Grilles, registers, dampers, and baffles will be thoroughly cleaned and oiled.

Coils and Fins—Coils and fins will be thoroughly cleaned out, employing 50 pounds of pressure of air or steam and air, together with GME formula No. 3 and carefully dried with air.

Stacks and Intakes—All interior surfaces of stacks will be thoroughly cleaned in the same manner as ducts, employing all safety measures in order to circumvent accidents, by employing experienced riggers only.

Duct Coverings—Where ducts are covered with insulation material, in making the openings the insulation will be cut in a neat workmanship manner, and at the direction of the customer, the insulation will either be replaced over the openings, or permit accessibility to doors or plates without replacing this material. Canvas connections between fan and ducts will be carefully checked for deterioration and will be replaced, if requested, at an additional cost.

Agitation and Vibration—Agitation and vibration methods used are designed not to mar, separate seams, or otherwise damage ducts.

MAINTENANCE OF AIR CONDITIONING is important for the assurance that the equipment will deliver the service that is desired. While theatre maintenance men do much, outside aid is often very desirable.

Drop Cloths—As a result of the technique described in paragraph on protection, during the normal operations of cleaning, drop cloths will be unnecessary, however, where work is required in overhead areas, where it is necessary to protect surfaces below, clean drop cloths will be carefully employed.

Supervision—All operations will be performed under the direct supervision of a thoroughly experienced and carefully trained supervisor.

Inspection—All work on ducts and fans will be subject to your inspection previous to our closing up the system. We will arrange with your inspector to view the clean condition of the ducts and fans after the completion of our work, by illuminating the interior of ducts and fans for your examination.

Protection—Special filters will be inserted in all supply grilles while working on the system to insure and guarantee against any dust and dirt discharging into the conditioned area during the progress of the work. Further, a special technique and treatment of the fans with GME Formula No. 2 will prevent the fan from discharging dust and dirt during the period of cleaning.

Safety—In performing the work in the systems, spark-proof motors will be employed. All lights used will be of safety type for fire prevention. All ropes, ladders and other equipment to meet the standard Safety Codes and Fire Prevention Codes. All precautions will be taken to insure against accidents and fires.

Hazardous Work—All work done in systems conveying explosive fumes, such as gas, lacquers, or organic materials, will be performed with non-ferrous tools and equipment, designed for this type of work, such as ample protective insulation on cords, vapor-proof lights, supplemented by our system of ventilation for the movement of air during operations and all will be done in conformance with good safety practice under the direction of a competent safety engineer.

Time of Cleaning—All work will be done at a time most convenient to the customer, and in a manner which will not interfere with the normal operation of the customer's business. Systems may be used during the process of cleaning unless agreements are made, by both parties, to the contrary.

Insurance—All work will be covered by Workmen's Compensation, Comprehensive Public Liability, and Property Damage Insurance and certifications will be supplied upon request.

Supplies, Tools, and Equipment—All prices for the above work embrace supplying of all special and patented equipment, tools, and material. All material is warranted to be of the highest grade obtainable.

Warranty of Service—Due to conditions beyond our control—viz.: excessive dust precipitation, failure to clean filters or removal of filters—we cannot guarantee cleanliness of the system beyond the period of its prompt completion by us. It is, therefore, necessary that our work be inspected and approved within 24 hours after completion. In the absence of this approval, it should be construed that at the time we completed the job it was satisfactory, and we, therefore, will not be held responsible for any claims thereof, except in the case of a permanent maintenance contract.

Standard—The standard of our work is in conformance with the standards as set forth by the National Fire Protection Association, Code N. B. F. U., Pamphlet No. 90, providing for duct cleaning.

Terms—Net. Payments to be made on the 10th of each month for 90 per cent of the value of all work completed to the last day of the preceding month. Final payment to be made ten days after completion and acceptance of this work.

Conditions—This proposal is subject to acceptance within sixty days of submission or in the event that this period has elapsed, we reserve the right to examine the proposal and the work involved to determine whether there will be any additional costs, due to any additional installations or the accumulation of further material in the system.

All agreements and contracts accepted subject to strikes, riots, acts of God, or conditions beyond our control.

All commitments pertaining to motors and equipment not manufactured by us. Delivery dates and warranties contingent on manufacturers' commitments to us.

Agreements are not binding on General Maintenance Engineers unless approved by a member of the firm.

Service Contract—We will service fans, grilles, and filters, once a month, on a five-year contract, for the sum of ——— a month. This service will include carefully checking the filters, cleaning, and replacing same, when necessary, cleaning and lubricating the fan, checking the grilles for elimination of dirt.

References—We beg to submit the names of a few of our clients, for whom we have performed similar services, in order that you may refer to them and determine the efficiency and safety factors of our work, as well as our ability.

SERVICE FROM UNIONS

American industry seldom looks to unions for service and, all too rarely, do unions offer any service to industry. However, a pleasant exception to the rule is Local 171 of the Moving Picture Machine Operators, of Pittsburgh.

Recently this local started a booth-inspection service, for the benefit, not only of the projectionists, but also of the theatre managers and operators. The reports made by the two-man inspection committee are rendered in triplicate, one copy going to the exhibitor, one held by the inspection committee, and the last to the union office. When conditions are faulty, a letter calling attention to the particular conditions is sent to the exhibitor.

The form, as submited by William H. Thompson, the union's business representative, provides at the top for data as to the theatre, and its location, date, time of inspection, type of projectors, type of arc lamp, and type of sound.

The body of the form allows ample space for making notation on the following topics: Projector head, including magazines; sound head; arc lamps; reflectors; arc generators or rectifiers; amplifiers and speakers, and so forth; ventilation (exhaust fan and the like); safety equipment; conveniences (toilet and lavatory); condition of the booth; and unclassified comments. Names of projectionists on duty and those of the inspecting committee are included. At the bottom of the page, space is provided for the "fifty words or less" to complete the statement, "We have made an inspection of your projection room and equipment and submit the following."

THE LARGER DUCTS may be inspected from the inside and any equipment therein fixed up according to the needs. Smaller ducts frequently need special equipment, used by workmen with special training.

A PROJECTION ROOM with all too little space wherein to work to best advantage is shown here. Note particularly the closeness of the projector to the side wall and the general crowding of the equipment. It is hard to believe that architects could design and that efficient theatre operators could permit such condition to obtain, but here is photographic evidence. Union committeemen are well aware that working conditions are very important.

In conjunction with this service, the union also takes action, for when the projectionist is found to be lax and remiss in his duties, he is corrected by the union office.

Thompson states that this service has been accepted by employers in the Pittsburgh area and the system has worked out very satisfactorily all around.

HOUSEKEEPING AND MANAGEMENT

In recent months there has been established for eastern Pennsylvania two services for exhibitors, one of which will be described further on. The other is a housekeeping and management report.

It is very difficult for any theatre manager, however capable, to see his theatre precisely as an audience sees it. While he may see and correct many faults and poor conditions of this theatre, he does it, nevertheless, strictly as one on the inside.

So, in order that a theatreman may have some idea of how the theatre appears to the casual patron, this housekeeping and management service has been established.

This service is actually a dark check of the house, made by a man and a woman and at a time they only know, with the exception that the checking is never done on the manager's day off. That the couple making surveys may not become recognized in a particular area, the checkers are rotated.

In the sample actual report, there is found the complete story of one theatre. It is particularly of interest because it is the second on this particular house and notes certain conditions unremedied from the time of the earlier report.

With a service such as this, the theatre operator can, periodically, keep a fine check on himself and his theatre.

INVENTORY SERVICE

It is a general human failing that the forgettery is considerably better than the memory. And, since theatre managers are, some evidences to the contrary notwithstanding, quite ordinary guys after all, they, too, are fraught with human weaknesses, and many a record that were good to be made is not made.

Most business concerns take time, at least every six months, to do the inventory and so to determine just what is what, not only with regard to the company's stock-in-trade, but with regard also to the physical equipment.

Since a theatre's stock-in-trade—the films projected upon the screen—is fairly constant, and changes from week to week (or more frequently), this aspect of inventory can be overlooked. But there are thousands of items in a theatre on which a check should periodically be made, not only to know what was on hand, but to reduce needless buying.

To perform such inventories would seem, once the record is made, and the proper books set up, a prosaic and routine matter. Yet the mere familiarity with a theatre frequently causes one to forget certain out-of-the-way closets and rooms or to rely, oftentimes erroneously, on memory as to the precise nature of the contents.

It is desirable, then, that an outside service company perform such inventory services for theatres.

Chief among the advantages of this service is unbiased completeness of the record, with all tendencies to overlook and to discount, however unintentional or deliberate, eliminated.

Because of the great variety of items purchased by a theatre, many articles not dissimilar to those used in one's home, there is at times considerable leakage of supplies. With an outside agency performing the inventory—and this fact known to all employes—a deterrent is immediately placed upon anyone's appropriating to his own use property, however inconsequential, belonging to the theatre. It is not meant to imply that theatre employes are thieves in the usual connotations of the law, but where there is an unlimited supply of light bulbs, for example, the taking of three or four which "won't be missed" is often done without malice aforethought. In the long run, these petty drains can become quite considerable, and they should, of course, be stopped.

Another major advantage of such inventory service is thoroughness. By the very way in which theatres are designed and built, there are many spots where cupboards, closets and rooms may be located to take advantage of the space to the greater utilization of the whole structure. And, of course, the more storage space there is, the greater the chance of forgetting where any particular item might be. Accordingly, one may recall putting an article in one spot and then, when it is not there when next needed, it is presumed that there is no more, and a new supply is ordered—and put in another place! And, all the while, the first purchase is reposing untouched in yet another location!

When an inventory-service company goes through a theatre, everything is covered, and many a surprising discovery is made.

Elsewhere in these pages is a sample of such an inventory. Through the courtesy of the service's J. A. Kraker, this material is offered, with all marks to identify the particular theatre removed. A mere examination of the report shows that a little bit of everything, practically, is stored all over the theatre. For example, lamp bulbs stored in quantity in two places.

Without knowing the particular theatre, whether anything different could have been done, it is surely manifest that a more orderly consolidation of supplies and equipment could be effected with profit.

What is here presented is as it appears on the report. However, there is, from the standpoint of the theatre, one short-

ANOTHER PROJECTION BOOTH wherein the miracle is that serious accidents are not the rule. Here are seen overhead wires, and a sprinkler system line propped up from the floor—with but five feet clearance under the horizontal pipe. Union committeemen report on such conditions as this and recommend the necessary changes to make the job more than just a job. Here there is no reason why this sprinkler system cannot be properly relocated.

HOUSEKEEPING AND THEATRE MANAGEMENT REPORT

Outside of Theatre

Were bulbs in all sockets and marquee lighted?
One empty socket.
Was sidewalk clean?
No.
Were photostands in proper condition?
Yes.

Cashier

Description
Manager cashiering
Was box office clean?
Yes.
Was door closed?
Yes.
Was ticket issued from machine?
Yes.
Were loose tickets in sight?
No.
Were bills in sight?
No.
Was cashier courteous?
(Blank)
Was she talking to anyone not in line of duty?
(Blank)
Was anyone in box office with her?
(Blank)

Outside Lobby

Were bulbs in all sockets and all lights on?
Yes.
Were there any loiterers?
Yes.

Doorman

Description
Middle-aged, gray-haired man, wearing blue suit and glasses
Did he thank you when ticket was presented?
No.
Did he tear it and give you half?
No.
Were any untorn tickets in sight?
No.

Auditorium

Was light sufficient?
Yes.
Were all exit red lights on?
Yes.
Was sound proper? Too loud? Too low?
Sound and projection o. k.
Any break in continuity of show?
No.
Theatre temperature comfortable?
Hot.
Patrons orderly?
No.
Ushers at proper stations?
None seen.
Were you shown a seat?
No.
Were flashlights properly used?
None seen.

Manager

Description.
A man of medium height, dark hair, wearing tan plaid shirt open at the neck, no tie, and he was also left-handed.
What was he doing?
Cashiering.

Men's Room

Properly lighted?
Yes.
Properly ventilated?
Yes.
Clean?
Toilet proper fair.
Odors?
None.

Ladies' Room

Properly lighted?
No, very dull lighting.
Properly ventilated?
No.
Clean
No.
Odors?
Yes.

Remarks

Before entering the theatre at 7:50 P. M., I noticed that the pavement could stand a sweeping, and also there was quite a gang of fellows hanging around the front of the theatre.

The tickets were purchased from manager, as he was acting as cashier when we went in, and he was also just leaving the cash box upon leaving at 9:50 P. M.

After handing tickets to doorman, who kept the whole ticket and did not thank me, entered the theatre and immediately inspected the rest rooms, reporting the following conditions:

Men's room: There was still no sign designating the Men's Room, as on the first inspection. There were plenty of cigarette butts and matches on the floor, and in the alleyway leading to the toilet rooms, while this room was fairly clean.

Ladies' Room: There was little or no change in conditions since first inspection, poor lighting, ventilation, plenty of odor, and lots of water all over the floor.

We then selected our seats as there was no usher or usherette on duty at this time nor at any other time during the evening.

An odor was noticed most all evening, it being either a musty odor or could possibly come from the Ladies' Room. It was very offensive.

As on the first inspection, there was a continual running up and down the aisle by patrons, both large and small, and a constant talking in the back of the theatre, which was very annoying.

Several instances of smoking were observed in the back of the theatre during the evening, with no one stopping it.

There was a young fellow playing piggyback with a little girl, who kept asking him to do it again.

This not being dish night, there was no noise from that source, but the boys changing the marquee made quite a lot of racket which could be heard inside the theatre.

The lights were all on when leaving, and only noticed one empty socket on the marquee, with no bulbs out, this at 9:50 P. M. The manager was just leaving the cash box then.

The show for the evening consisted of the following: Features, "The Woman in the Window" and "Leave It to Blondie"; cartoon, did not get title as it was nearly over trailers, "The Imposter" and "Identity Unknown."

coming: only in rare cases is it shown precisely what a particular piece of equipment is. To make this record complete, every major equipment entry should have the following information somewhere in the record: Make, model, serial number, size, and other data for the identifying of a particular piece of equipment.

For example, it does not matter so much that there is, in the projection booth, a large, a small, and a carbon-dioxide fire extinguisher. What matters is the type of extinguisher that is identified as "large" and "small"—and are they what should be, according to underwriters' recommendations, what should be there.

And, of course, in the interest of completeness and finality, no item should be listed without a notation as to quantity nor should anyone's word be taken on the contents of a closet or cabinet. In the latter case, however, the contents may not be within the scope of the inventory, but the serviceman should rely on his own inspection, not on hearsay evidence.

Even though the report as given here does show some shortcomings, it can be of great value to the exhibitor, not only as a deterrent, psychologically, on petty thieving, but as revealing supplies stored in different, and unremembered, places.

INVENTORY OF EQUIP

FRONT AND AREAWAYS

Standards, "No Parking"	2
Frames, wall, outside	6
Ladders, "A"	1
Ladders, 12-foot	1
Ladders, step, 8-foot	1
Ladders, extension, 40-60-foot	1

LOBBY

Frames, wall	9
Mats, rubber	1
Choppers, ticket	1
Call boxes, intercommunicating	1
Spotlights	6

BOX OFFICE

Machines, ticket (B2273)	1
Typewriters, portable, Remington	1
Clocks, electric	1
Boxes, cash, metal	1
Vases	2
Baskets, waste	1
Stools, foot	1
Chairs	1
Heaters, electric	1
Fans, electric	1
Boxes, call, intercommunicating	1

AUDITORIUM

Stools, step (at drinking fountain)	1
Machines, candy	1
Lanterns (lights), emergency	1
Pianos (in orchestra pit)	1

Ladies' Room, off Auditorium

Mirrors	1
Containers, towel	1
Receptacles, towel	1
Holders, toilet-paper	2
Containers, disinfectant	2

BALCONY

Top of Landing, Right Side

Machines, candy	1

Corner Closet

Plungers	1
Brushes	1
Paper, toilet ....rolls	2
Towels ....package	1

Alcove, Balcony Entrance

Extinguishers, fire (on right side)	1
Extinguishers, fire (on left side)	1

Store Room, off Stairway

Lockers, steel, utility (said to contain candy; contents not checked)	1
Brushes	2
Brooms	1
Frames, display	2
Sand ....buckts	3

Letter Rack

The following letters are used for marquee ends.)

A	6
B	6
C	1
D	5
E	9
F	6
G	3
H	4
I	5
J	4
K	3
L	5
M	0
N	1
O	6
P	9
Q	2
R	2
S	9
T	2
U	2
V	6
W	6
X	2
Y	4
Z	0
1	0
2	3
3	4
4	6
5	0
6	4
7	7
8	0
9	0
0	0
Signs, "Coming Attraction"	4
"And"	1
"In"	1
Marks, quotation	4

Men's Room

Receptacles, paper	1
Containers, towel	1
Mirrors	1
Containers, disinfectant (3 attached to urinals)	5

PROJECTION BOOTH

Toilet Room

Containers, toilet-paper	1
Containers, disinfectant	1

Rewind Room

Benches, work (containing rewind set with motor attached, film scraper, film splicer, 2 pairs shears, screw driver, film-cement holder, 13 spare reels)	1
Closets (attached to wall) (containing trailers)	1
Cabinets, film, steel, 16-compartment	1
Brooms	1
Mops	1
Pans, dust	1
Brushes	1
Cables, projection-lamp	15
Fans, electric	1
Cement, Film ....cans	2

Projection Room

Extinguishers, fire, large	2
Extinguishers, fire, small	1
Extinguishers, fire, carbon-dioxide	1
Cans, trash	2
Benches, work (containing vise, hand grinder, and tool chest)	1
Cabinets, tool, hanging	1
Chests, tool	1
Cabinet, miscellaneous	1
Shelves	2
Motors, electric	1
Jaws, contact, carbon	5
Holders, carbon	3
Check, Door	1
Fans, electric	1
Files, correspondence	1
Cabinets, small (with bolts)	1
Cabinets, steel, 6-compartment (1 compartment containing 238 carbons 9mm. by 20 inches)	1
Sand ....buckets	4
Cans, oil	2
Clocks, electric	1
Chairs, reclining	1
Stools	1
Stools, foot	1
Testers	1
Spotlights (on floor standard)	1
Spotlights, small (1 over window)	2
Flashlights	1
Cleaners, vacuum	1
Soap, liquid ....bottle	1
Machines, projection (complete with Simplex heads, Western Electric sound equipment, Peerless High arc lamps numbers 3561 and 2764, sound volume-control boxes—1 each to a machine; and one Western Electric amplifying unit 3XU46)	2
Players, record	1
Cases, record, mounted (containing 15 records)	1
Oil, Simplex ....gallon	1
Fans, wall (blower)	1
Stands, work-light	1
Sets, heat (for testing)	1
Cabinets, utility (containing clothes, books, towels, etc.)	1
Mats, rubber (rolled)	1
Cabinets (containing 2 spotlamps, 2 grease guns, 1 oil can, dishes, etc.)	1
Containers, hand-towel, automatic	1
Cabinets, medicine	1
Dispensers, soap	1
Cords, extension, 20-foot	1
Cabinets, containing 2-, 3-, 6-, and 30-amp. fuses)	1
Sockets ..,porcelain, swivel	5
Tubes, 205D	2
Tubes, 264	3
Fuses, 100-amp.	4
Holders, exciter-lamp	2
Lamps, exciter	5
Lamps, pilot	2
Tubes, 242	3
Bulbs, photo-electric, 3-A	2
Brushes, generator (with springs)	6

(Supplies of friction, rubber, and photographic tape noted but not recorded.)

Generator Room

Transformer, Western Electric, 18-volt, d.c. ....unit	1
Generators, service, 70 amp. a.c.-d.c.	1
Generators, multiple, 80-160, a.c.-d.c.	1
Battery (with charger and tester)	1
Guards (covers), wire	1
Cable, microphone, 3-wire, ..feet	300
Cord, extension, 20-foot	1
Fans, ventilating, booth	1
Rheostats, ballast	3
Machines, ticket, Simplex B2699	1

STAGE

Flags, American	2

BACK STAGE

Sand ....can	1
Wheelbarrows	1

MENT AND SUPPLIES

Extinguishers, fire 2
Motors, electric, curtain 1
Ladders, step, 10-foot 1
Ladders, "A," large and small ... 2
Frames, photo, large 2
Lights, flood 2
Runners, carpet (several rolls, exact amount not noted.)

Room, Left Side

Seats 104
Backs, chair 53
Sand .....buckets 2
Extinguisher, fire 1

Letter and Bulb Room

(The following letters are used underneath the marquee.)

A 12
B 6
C 6
D 8
E 14
F 6
G 5
H 6
I 14
J 4
K 6
L 11
M 8
N 9
O 12
P 8
Q 2
R 7
S 9
T 9
U 9
V 4
X 2
Y 4
Z 2
a 7
b 7
c 5
d 4
e 5
f 5
g 2
h 6
i 12
j 2
k 6
l 5
m 5
n 5
o 7
p 8
q 2
r 3
s 5
t 8
u 4
v 4
w 3
x 2
y 3
z 2
"In" 1
"The" 2
"With" 3
"Also" 2
Marks, quotation .....pair 4
"And" 2
"Of" 2
"Technicolor" 1
Letters, assorted (not included above) .....box 1
Bulbs, white, 60-watt 84
Bulbs, white, 60-watt 120
Bulbs, red, 40-watt 96
Bulbs, red, 40-watt 18
Bulbs, yellow, 15-watt 89
Bulbs, yellow, 25-watt 85
Bulbs, green, 6-watt 19
Bulbs, amber, 40-watt 36
Frames, chair 81

BELOW STAGE

Areaway under Stage

Cans, trash 11
Stands, work-light (500-watt bulb in one) 2
Sweepers, electric 1
Bottles, 5-gallon (with wooden case) 1
Ladders, 4-foot 1
Ladders, 8-foot 1
Sweepers, carpet, hand 1
Cleaners, vacuum, portable (with hose and attachment) 1
Mats, rope 1
Extinguishers, fire 1
Balers, paper 1
Hose, water .....feet 50
Frames, card 12
Frames, display 6
Fluid, cleaning .....can 1
Letters, assorted .....box 1
Shovels 1
Saws 1
Signs, "Continuous All Day"..... 1
Frames, 40x60 2
Frames, "Now Showing" 6
Signs, day, paper .....bundle 2

Locked Room, Right Side

Brooms, new 5
Mops, new 2
Paper, toilet, roll 552
Cakes, deodorant .....package 4
Aprons 2
Bon Ami .....can 1
Bon Ami .....cake 1
Benches 1
Mirrors 1

Ushers' Dressing Room

Benches 1
Mirrors 1
Uniforms, theatre (consisting of coats and pants) 12

Locked Room, Left Side

Bulbs, Christmas, assorted colors. 16
Powder, roach .....can 2
Flags, American (with sticks)... 12
Flags, American (without sticks). 2
Lights, Christmas-tree.....sets 36
Hammers 1
Brushes, stencil (and can)..... 1
Fronts, embassy 60
Collars, wing, assorted sizes.....600
Shields, color, glass 16
Towels, paper .....roll 15
Paint .....quart 9
Paint .....gallon 3
Cloth, oil .....roll 1
Bulbs, Lumiline, 30-watt 18
Bulbs, yellow, 25-watt 55
Bulbs, blue, 25-watt 50
Bulbs, white, 40-watt 96
Bulbs, white, 6-watt 60
Bulbs, green, size not noted.....100
Chests, tool (containing saw, brace and bit, file, hatchet, breast drill, pliers, hammer, screw driver, four door checks, and box of assorted nails) 1
Mirrors 1
Closets, hanging 1

Boiler Room

Boilers, Atlas 1
Burner, Williams Oil-O-Matic, No. 212336 1
Stokers, coal (with blower attached) 1
Extinguisher, fire 1
Cans, trash 1
Buckets 2
Heater, hot-water 1
Pump, Decatur (complete)..... 1
Brooms 1
Mops 1
Brushes 1
Wrenches, street, gas (or water). 1
Pumps, stirrup 1
Shovels, scoop 2
Shovels, push (snow) 6
Choppers, ice 2
Brushes, wire 1
Cans, soap, 5-gallon (partly filled) 2
Benches, work (with vise, one gallon Noxon cleaner, box containing "Sun Thru Mon" paper day signs, four paint brushes, 50-ft. extension cable, rubber mat) 1

Right Side, under Stairway

Buckets 2
Fans, electric 1
Brooms 3
Mops (1 without handle) 3

OFFICE

Mirrors 2
Extinguisher, fire 1
Extinguisher, fire, Pyrene 1
Cabinet, filing 1
Lockers, ticket, steel (contents not checked) 1
Spotlights 1
Microphone, desk (and control).. 1
Lanterns (4 on shelf, 1 on wall).. 5
Chairs 2
Chairs, desk 1
Chairs, typewriter 1
Desks 1
Tables 1
Typewriter, Underwood, No. 4407164-11 1
Boxes, filing 11
Units, refrigerating, window-type 1
Units, inter-communication, Philco 1
Stands, smoking 1
Units, scotch tape (complete).... 1
Trays (containing water pitcher and glasses) 1
Staplers, small 1
Sets, pen, desk, large 1
Sets, pen 1
Clocks, electric 1
Sharpeners, pencil 1

Notes on Post-War Theatre Sound Service

Future Improvements to Be More Complex Making Vigilant Servicing More Necessary

E. S. SEELEY
Chief Engineer, Altec Service Corporation

World War II presented us with reduced manpower, priorities, curtailed production, gasoline rationing and the many other regulations. While we do not think our wartime problems were any more severe than those of other organizations, we do know that in spite of these many handicaps we kept the theatres running.

To many a well-meaning government agency, the motion-picture theatre was just another unnecessary form of amusement in the same class with the juke box and pinball machine. Much can be said for the ingenuity of the individual service engineers during these early days of restrictions. All sorts of haywire arrangements were used to keep the shows running.

Meanwhile, other Government bureaus were busy turning out propaganda films cautioning the public regarding the conservation of materials; dramatizing the activities of the Federal Bureau of Investigation; exploiting the sale of war bonds and action pictures of our fighting forces. The conflict between the divergent views in Washington was finally resolved by President Roosevelt, who, in a public statement recognized the necessity of keeping the motion picture theatres operative to maintain the morale of the public and to present to them the various propaganda films. This clearly necessitated servicing and maintaining the sound equipment. Altec representatives again made trips to headquarters in Washington and were now more cordially received. It was realized that they represented an established organization serving over 6,000 theatres, more than one-third of the theatres in the country and knowing exactly their sound parts requirements. The advantage of dealing with a single agency instead of 6,000 individual theatres was apparent and we became the focal point and the clearing house for the sound equipment needs of the theatres.

As a result of our efforts, and those of representatives of certain major chains, a blanket priority classification AA2 was issued covering all repairs and replacement of equipment for theatre sound systems. Even with such a high priority a real problem remained of getting manufacturers and suppliers to furnish the equipment necessary to keep the theatres running. Our ability to purchase in volume, our distribution facilities and close contact with all phases of the situation solved this problem economically and effectively. Then, too, the equipment in closed theatres and the spare parts carried in each theatre became a vast stock pile available through the service organization to all theatres. Basements and garages of service inspectors proved gold mines of now-prized parts which were once considered junk. Frequently, when we found the stock bin empty and desperate need arising, distress signals were broadcast to the inspectors and 250 men flushed the needed parts out of dusty corners, second-hand stores, and even pawn shops.

Many unusual means were adopted for getting the last useful hour of operation out of each and every part of the sound systems. Testing and repair procedures were set up for vacuum tubes to conserve these parts so vital to the armed forces. Many electrical and mechanical parts which had formerly been discarded when they became defective were returned to our repair shop for rehabilitation. To conserve copper, we devised a unique method of repairing bellows assemblies, since each contains 14 ounces of strategic copper and there were several thousands used in theatres. While on the subject of copper, it can be mentioned that our field engineers served as the collection agency for copper drippings from arc lamp carbons and many pounds of this vital material were collected and turned over to salvage depots.

One of our most difficult problems was that of getting sufficient gasoline for the field engineers to provide rapid transportation to theatres in case of emergency. The frequently-changing regulations and their non-uniform interpretation by the local rationing boards made it difficult and, in some cases, impossible for these men to secure gasoline. Here again through correspondence, telephone calls, and trips to Washington, we finally succeeded in having a special regulation issued covering this situation.

Time is not available for further details of the battle to keep the thousands of theatres operating thru these troubled days, but we are proud to report that—there was not a single instance of a theatre serviced by us which shut down due to non-availability of replacement equipment.

FUTURE SERVICE, DEVELOPMENTS

Now in closing let us try to see what the crystal ball shows. The most reliable crystal ball in this case is a mirror which shows the future as an extension of the past. The pattern won't change radically and step by step improvements will continue to reach the motion picture theatre. These improvements will result in greater complexity in the technical sense than those of the past and they will be brought speedily into the theatre by the service organization. The training of service inspectors will be as important as it has been in the past to provide them with the necessary knowledge to adapt the improvements to the individual theatre and new tools and test equipment will be required to insure that all theatres are operating at their peak of performance.

What will be the nature of the new developments? A specific answer to this is not available to your speaker, but we know that a great deal of competent engineering attention is being given to such things as control track, automatic volume control, stereophonic sight and sound, television, panoramic or wide angle sound origin, extended range, and new color film which will require modification of reproducing equipments. Until the details of any of these developments crystallize, we cannot foretell today precisely the action that they will require on the part of our service organization. However, it is likely that improvements will come more or less abruptly and that large scale efforts on our part will be required to insure that no theatre will be scooped by its competitor. History tells us that voluminous technical information must be prepared and distributed to the field men and that new standards of performance will be established for uniform maintenance to preserve the advancement.

Altec is well organized to provide all that is required by the theatre. Close liaison and participation in the activities in Hollywood and with the equipment manufacturers allow us to anticipate and prepare for any innovation. A competent Headquarters Engineering Staff will appraise each approaching innovation in relation to the individual problems presented by the numerous specific types of sound reproducing equipment, and prepare the required technical information for the field and the necessary tools and test methods, and the field organization will cope with the actual application of the innovation in each particular theatre. Following the exciting period during which the innovation is introduced, the service inspector will guard the equipment to maintain the new standard of performance.

With the protection afforded him by our complete organization, the exhibitor may welcome with confidence and without apprehension approaching evolution. Thousands of exhibitors, the backbone of the industry, will continue to attest to the necessity of them of such a complete organization.

The accompanying look-see at the past and future of theatre sound service comprises the last portion of an address by the author, presented before the Atlantic Coast Section of the Society of Motion Picture Engineers on November 13, 1946.

Theatre Preservation through Maintenance

Big Portion of Post-War Theatre Expense Will Stem from General Poor Maintenance

E. H. GEISSLER
Assistant General Manager, Wil-Kin Theatre Supply, Inc.

Our industry is just starting into the largest and most inclusive theatre rehabilitation program in the history of show business. When we are allowed to proceed with actual work, this program will include major improvements to a very large proportion of the total number of our theatres and will call for the expenditure of a tremendous amount of money. The greater portion of this expense—and I say this advisedly—the greater portion of this expense has been made necessary by general poor maintenance throughout the war-time period of operation.

It would be eminently unfair and serve no constructive purpose to assert that all of this obvious waste could have been prevented, knowing the conditions under which we were forced to operate during the war. It would, at the same time, be less than honest and only serve further to promote whatever attitude of complacency exists if we fail to admit that a better job could and, in most instances, should have been done even under the trying conditions of the past four years. The important thing is that as businessmen we recognize the tremendous waste of time and money resulting from poor maintenance and decide here and now to do something definite about improving it.

An analysis of the cause and relative cost of poor maintenance will further that objective for if we can determine wherein we are wrong and are then sufficiently impressed with the cost of our mistakes, we have both the foundation and the incentive for improvement.

POOR ORGANIZATION

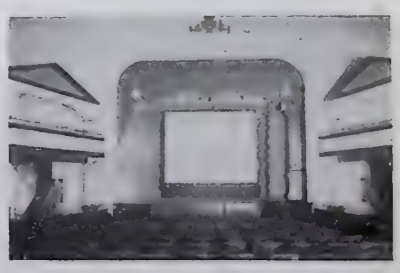
The underlying cause of all poor maintenance is poor organization. Failure to give complete and definite instructions—failure to designate definite responsibility—the complete absence of comprehensive and intelligent work schedules and finally and most important—the failure at regular intervals to inspect the entire operation. Organize, Teach, Delegate, Schedule, and then Inspect.

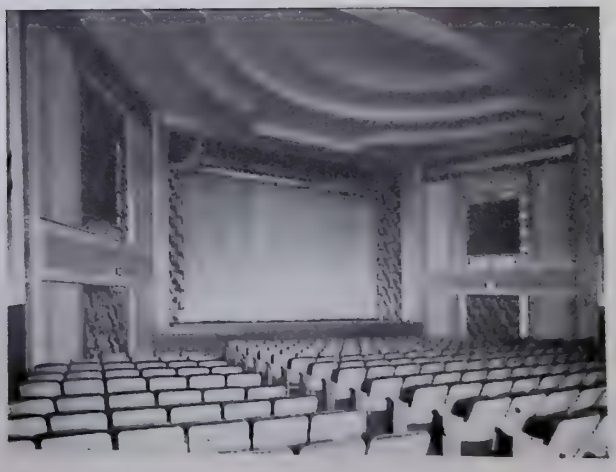
Let us take the most important single phase of maintenance as an example. I refer to housekeeping and please keep in mind that this is the most important single phase of maintenance for without good housekeeping we will never have good maintenance. We all know that hiring a janitor, giving him a broom and telling him to sweep out the joint is not a very effective way of getting a theatre clean. No, house cleaning must be organized. Our janitors must be given complete and definite instructions on exactly how we want the job done and that includes instructions in the proper use of their tools and cleaning supplies. The work itself must be scheduled so that the entire house can be covered in the time allotted. Each individual in the crew must be made responsible for a definite portion of the work so that he understands exactly how much he is expected to accomplish and can be held responsible for it. Each must realize that his work will be inspected at regular intervals and that he will be held accountable for results in his own particular operation. Then—and only then—will we keep our theatres clean and the fact that we may have only sorry help available emphasizes the need for constant instruction and inspection.

GOOD MAINTENANCE

Good maintenance, then, like good housekeeping, results from intelligent organization coupled with regular and frequent inspection to see that everyone concerned is doing his job and doing it right. Keep in mind that whenever we pay an employe to do a particular job of maintenance and we allow him to do it badly we are actually using our own funds to subsidize the gradual destruction of our property. It is the height of under-statement merely to say, "That's not good business!"

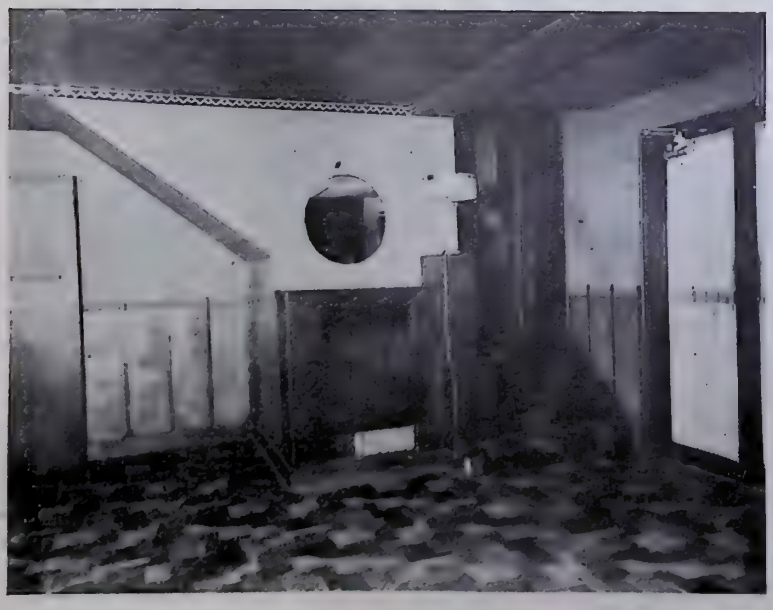
THE MAJESTIC THEATRE, Johnson City, Tennessee, in these before and after shots, reveals one of the complete remodeling jobs designed, built, decorated, and fully equipped by the Wil-Kin Theatre Supply, Inc. Here an old stage-show theatre was taken, the big stage removed to add approximately 30 feet to the length of the auditorium without adding to the overall cubage. This is an example of what can be done to modernize an old, out-moded theatre on a very limited budget, and, by judicious use of space, increase the seating capacity and simplify routine maintenance. Good maintenance, like good housekeeping, results from intelligent organization coupled with regular and frequent inspection to see that everyone concerned is doing his job and doing it correctly. With modern theatre design, many of the maintenance problems can be simplified by the judicious handling.





THE STRAND THEATRE, Columbia, South Carolina, is another limited-budget remodeling job, designed, built, decorated, and fully equipped by the Wil-Kin Theatre Supply, Inc. As seen in the pictures of the front (above and left center), the former Rex Theatre was changed but little in basic architectural design, accounting, perhaps, for the fact that all of the work was started and completed and the theatre reopened in only ten short days.

THE CORNER OF THE LOBBY of the Strand theatre, where the stars lead to the upper floor (right center and below) show the elmination of some walls which only made more difficult the maintenance of the area. The new flooring as well as the redecoration, give the foyer an aspect of spaciousness far in excess of that intrinsic amount actually made available through the redesigning. The budget for design, construction, and equipment was very limited.



In order to effect and perpetuate a high standard of maintenance there must be a deep rooted and sincere conviction throughout the entire industry that this phase of our job is important. It must start at the top with the responsible head of each exhibiting organization—whether he operates one or 100 theatres—demanding good maintenance and accepting nothing less. From our general managers and district managers it calls for insistence on, and assistance in, intelligent organization and that includes a study of each individual operation under their supervision to determine personnel requirements therein and to set up a budget sufficient in each instance to hire the people necessary to do the job. Finally, and most important, it evolves upon the individual manager as the active custodian of our property to use wisely the personnel and tools available—and by intelligent organization, constant instruction and eternal viligance keep our physical property in a continual state of good repair.

POOR MAINTENANCE

And now let us consider the relative cost of poor maintenance and while we discuss it let us hang one of our own well-chosen superlatives some place in our mind's eye where we cannot forget it—"Terrific!" is the word. The cost of poor maintenance is terrific! And the truth of that statement will be impressed upon all of us once we can see our fixed charges jump imediately following major improvements to our own theatre.

Today there is a scarcity of everything: Goods and services of all kinds. That means that we are forced to buy in competition every piece of equipment and every service we use. Because of this scarcity and because of ever rising production costs, prices have advanced beyond reason and the end of that rising spiral is not yet in sight. Every quotation on equipment, every bid for services that come into our hands carries a notation that all prices are subject to change without notice and manufacturers frankly state that these prices must be considerably higher if they are to continue to produce profitably. It should, therefore, be obvious that where poor maintenance was once an expensive indulgence it now becomes inexcusable negligence; a drain on our industry's resources that cannot be tolerated.

Like most other businesses we, in show business, amortize our equipment and depreciate it over a fixed period of time which time varies with different items of equipment but remains the same for each item regardless of location. Whenever it becomes necessary to replace equipment before it has been completely amortized and served its life expectancy we, in effect, compound our fixed charges for until the original equipment has been completely amortized, we must continue to pay for it and also for its replacement. In many situations due to repeated motor burn-outs, bursting boilers, and so forth, caused in most cases by poor maintenanace that compounding has sky-rocketed to the point where we are forced to charge off three and four times the normal amount and it is cause for alarm to each of us when we realize that every unnecessary dollar added to "fixed"

charges reduces our net profit by an equal amount. Conversely, when through proper maintenance we are able to prolong the useful life of equipment beyond the point where it has been fully depreciated, we add to our net profit an amount exactly equal to the normal fixed charge for that period. Because obsolescence in our business is almost negligible we have a right to expect that equipment will serve us usefully long after it has been fully charged off.

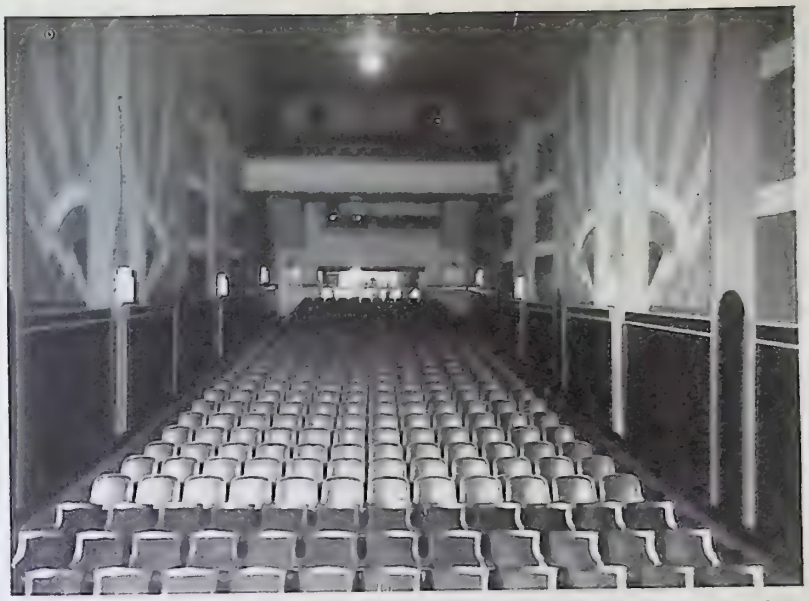
HAZARD IN SEASONING

A very, very important adjunct to showbusiness today is the sale of candy and popcorn. Almost in the same ratio that it has increased our profits, it has likewise increased our maintenance problems. That fact is definitely not an argument against its sale for if we were to adopt that line of reasoning we would be forced to conclude that the best way to solve all maintenance difficulties is simply to go out of business. It does mean that because of candy and popcorn our maintenance job becomes more difficult, more expensive and vastly more important because we are adding to our normal responsibilities a very sizeable hazard from fire. Please do not underemphasize this hazard. We are daily dumping into our theatres, a tremendous amount of waste material in the form of containers which in themselves are highly combustible and a very large part of this waste paper is thoroughly soaked with seasoning oils. Any discussion of the relative kindling points of various seasoning materials is purely academic. Some burn more readily than others as for instance, peanut oil, which is very dangerous, but it all burns and burns readily.

Over a period of time this seasoning oil is gradually ground into our carpets, spread over our floors, absorbed by our seat fabric and wiped into our draperies, leaving us sitting on top of the prettiest little package of dynamite in the world if the mess is allowed to accumulate. To date we have not been able to point to a definite fire and say "This was caused by popcorn seasoning" but it is an arresting and thought provoking fact that coincidental with the sale of candy and popcorn, theatre fires throughout the country have increased both in number and severity. The hazard is with us and if we neglect to combat and minimize it constantly by proper house cleaning measures, we subject ourselves to censure for what under extreme circumstances, may easily be classified as criminal negligence.

CONCLUSION

Let us not have this on our conscience. Rather, let us be guided constantly by the realization that we are a part of a reputable industry—a business, which as we know it, has won the respect and confidence of the general public over a comparatively short period of rapid growth. If we expect to maintain this position against ever growing opposition, sound business judgment dictates that we protect our physical property—that we show what we have to sell in theatres that are clean, comfortable and safe. Pride in our industry and our self-respect will allow for nothing less.



THE AUDITORIUM of the Strand Theatre reveals a type of decoration which plays down the fears on effect of the great length. Besides breaking up the expanse of wall area with special panel designs, the elimination of the two center aisles greatly adds to the appearance of the theatre. Since many cities say that no seat shall be more than six away from the aisle, this one-block seating arrangement is within the purview of most of the regulations.

COMPARING THE BEFORE PICTURES (center) and the after photographs (top and bottom) of the Strand Theatre, highlights what can be done on a limited budget. By reseating with a bank of 12 chairs to the tier, a much better aspect is presented than was possible with the 3—6—3 arrangement, even though there is no change in the seating capacity of the theatre. The fact that the ceiling was not touched makes no appreciable difference in the design.

A Short Story for theatre managers who are too busy sprucing up the house to read A LONG ONE

While you are booking the new pictures, laying new

carpets, and cleaning the house

inside and out; give some sober thought to your **SOUND EQUIPMENT**, the real heart of the show. Brand new

systems and old ones, too

need constant service to:

DETECT AND GUARD AGAINST SUBTLE WEAR AND TEAR
KEEP SOUND MECHANISMS CLEAN FOR HIGH QUALITY REPRODUCTION
TUNE UP YOUR SOUND SYSTEM FOR BETTER DISTRIBUTION TO THE "POOR SEAT" SECTIONS
MAKE EXPENSIVE BILLINGS SOUND THEIR MONEY'S WORTH
KEEP PACE WITH IMPROVEMENTS IN SOUND RECORDING
MAKE YOUR THEATRE A "FAVORED" ENTERTAINMENT CENTER

WHY ALTEC-SERVICE YOUR EQUIPMENT?

In sound equipment as everything else, we assert that half-way service is no better than neglect. Consider these reasons why ALTEC can give you more thorough sound service than any other organization: ALTEC, servicing more theatre sound systems than anyone else, can better judge the quality of reproduction in your house. ALTEC, with the world's largest supply of replacement parts, can meet any emergency. ALTEC, collaborating with sound engineers of the motion picture industry, is on the scene of every new development in sound recording. ALTEC, with a staff of America's most experienced engineers, offers you service arrangements that fit the requirements of your theatre.

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RCA THEATRE SERVICE

Preserve your equipment—keep it at maximum operating efficiency with RCA Service. RCA's nationwide service organization is well equipped to keep your equipment operating at peak performance. With a large staff of trained, experienced Field Engineers, plus the backing of the largest research and engineering development group in sound, radio, and the allied arts, RCA Service will help you solve your problems, whether they apply to sound systems, public address equipment, acoustics, projection, radio or television.

Only RCA Service offers you these outstanding features:

FREQUENT SCHEDULE EQUIPMENT INSPECTIONS

Scheduled inspections of your sound equipment will be made, insuring peak performance and long life—preventing box office loss. Thousands of theatre exhibitors employ RCA contract service at surprisingly low cost.

PROMPT EMERGENCY SERVICE

RCA emergency service means quick action when you need it—and because RCA Field Engineers have wide experience, trouble can be isolated and corrected in the shortest time.

SOUND AND PROJECTION PARTS

RCA looked ahead, and is therefore prepared to more completely fill your parts needs. To further insure long equipment life, contract for the RCA plan which provides the furnishing of parts and tubes at a small yearly cost.

LABORATORY, ENGINEERING AND MANUFACTURING COORDINATION

Only RCA designs, manufactures, sells, installs and services theatre sound systems. The RCA service organization therefore benefits from broad fields of experience, and is in a better position to solve your problems.

PROJECTION ENGINEERING SERVICE

RCA Field Engineers will at any time be glad to discuss with you problems relating to your projection equipment. Their experience enables them to offer you valuable advice.

ACOUSTIC ENGINEERING SERVICE

If you have acoustic problems in your theatre, ask your RCA Field Engineer's advice. He can help you, and if complex situations exist, he has access to the RCA staff of acoustic engineering experts.

EMERGENCY PORTABLE SOUND SYSTEM

The RCA emergency portable system is employed in many theatres. Ready for use in a few minutes, it is an extra safeguard for your sound. It reduces still further the possibility of sound outages.

For more information about RCA Service ask your nearest RCA Service representative or write RCA Service Company, Inc., Camden, N. J.

RCA SERVICE COMPANY, INC.

A RADIO CORPORATION OF AMERICA SUBSIDIARY

CAMDEN, N. J.

INTERNATIONAL ALLIANCE *of* THEATRICAL STAGE EMPLOYEES and MOVING PICTURE MACHINE OPERATORS of the UNITED STATES and CANADA

Affiliated with the American Federation of Labor

RICHARD F. WALSH
International President

WILLIAM P. RAOUL
General Secretary-Treasurer

Suite 803, International Building
630 Fifth Avenue
New York 20, New York

1946-47

Place of Trailers in Modern Management

With Proper Copy All Phases of Operation Can Be Exploited from the Theatre Screen

MELVIN L. GOLD
Director of Advertising and Publicity, National Screen Service, Inc.

If an advertiser were offered the front page of his daily newspaper for the placement of his advertisement, he would probably be willing to pay two to three times the normal display rate, for this preferred position. His reason, of course, would be the assurance that the front page attracts maximum readership, rendering his display advertising more valuable.

While it is not likely that he could prevail upon the average American publisher to grant him this preferred space in a newspaper (though it is common practice in England), the advertiser, if he is an exhibitor, has at his disposal a "front page" equivalent, one which provides him with 100 per cent "readership" from a select market made up entirely of theatre-goers. It is the "front page" of his theatre, his screen!

Here, he presents entertainment, and here, through the medium of the trailer, he carries to his patrons, every important message, announcement, and selling argument, with the knowledge that he is getting complete coverage of his audience, and that the message is getting the undivided attention of his patrons!

FEATURE TRAILERS

The role of the trailer in the over-all picture of theatre management is one of articulate contact between management and patron, propagating, informing and selling, with a versatility that covers almost every phase of the theatre's operation.

Best known and most widely used function of the trailer, is in the selling of the feature attraction. A service which has merited recognition as being second in importance to the feature alone. It is in the showing of the feature or production trailer that the big job of selling-the-attraction at point-of-contact takes place.

The use of the feature trailer, one week before playdate, is a recognized practice that has become more or less standardized in most theatres throughout the country. Exceptions would include long run theatres where it would be desirable to show the next attraction prevue, for several weeks in advance.

The ability of this celluloid salesman to sell an audience so effectively and induce the patrons to return to the theatre lies in its method of presentation, its eye-and-ear appeal, the fact that its distribution takes place by way of the theatre screen, which reflects the very entertainment for which the patron has paid an admission, and the 100 per cent theatre audience it reaches. In these respects, its effectiveness cannot be approached by any other advertising medium.

Actually, the feature trailer provides, for the theatre, the counterpart of what is known in commercial non-theatrical advertising, as a "sampling campaign". Whereas merchandisers of toothpaste, coffee, candy, or other commodities might resort to the distribution of samples of their product to potential users, the theatre offers, through the feature trailer, an actual sample of the picture that it advertises. Actual scenes and dialogue from the picture combine with titles and in many cases, narration from a qualified commentator, to bring the patron an inspiring sample of the entertainment being offered, with a good measure of advertising copy and sales-talk enhancing the presentation. Add to that, the fact that every person in the theatre has his or her attention focused on the screen, where assimilation of the message is unavoidable, and you can readily appreciate that the trailer is doing an unparalleled selling job to a 100 per cent audience of theatre-goers, all of them devoting undivided interest to the message being delivered!

Since the life-blood of the average theatre is the repeated attendance of its patrons, week after week, month after month, it naturally follows, that the smart exhibitor is fully cognizant of the importance of letting his patrons sample his coming attractions through his previews, and will, at any cost, arrange for the showing of his trailers at every performance.

There are occasions, when, with SRO business pressing the hold-out tapes, managers will sometimes shorten a program through the deletion of some unimportant subject, to effect more rapid turnover of patrons. That is when the trailer is more important than ever! That is when, because of maximum attendance, the trailer can deliver its message to the greatest number of patrons, bringing them back the following weeks, to more SRO business. That is, when the smart exhibitor remembers that, next to his feature, the most important subject on his program is the trailer!

TRAILERETTES, preceded by headers, help to establish a theatre's reputation for consistently good entertainment. A trailerette is especially prepared with photographs of the stars, title of the picture, and a listing of the star names. Prepared as a stock item, to allow for extensive artwork at nominal cost to the exhibitor, the trailerette is designed for use with groups of other trailerettes, covering a full month or more of playing time, if desired.

ANNOUNCEMENT TRAILERS

While the feature trailer is the important, well-developed sales-medium for feature attractions—enhanced by the know-how of the producer's advertising departments, the National Screen technicians, cutters, editorialists, optical-printing equipment, and sundry other highly specialized craftsmen and equipment, and is, therefore, tailor-made to best advertise the production—there is another type of trailer made available to exhibitors, which is adaptable to practically every phase of theatre management, by virtue of its elasticity and ver-

satility. This is the special announcement trailer, so-called because it is specially prepared for the exhibitor, at his request, and adapted to his individual needs and copy requirements, and containing such art and atmospheric embellishments as he may desire.

Its utility ranges from the selling of pictures, through screen exploitation campaigns, to the propagation of policy, service, and good-will messages, as well as a medium for obtaining extra revenue through merchant advertising. Its use for the enhancement of presentations, with date strips, presentation leaders, and so forth, lend prestige and individuality to the theatre.

Despite the fact that special trailers allow for individuality in thought and presentation, many trailers in this category are prepared in anticipation of the desires of the exhibitors, of a stock design and text. This procedure, entered into only when it is anticipated that the specially created design and text will fit all general needs, offers many advantages to the exhibitor, in that the skilled efforts of professional artists, copywriters, and advertising personnel give these trailers the benefit of their experience and know-how and the preparation of these trailers on a large scale, from a single negative, reduces the cost to the exhibitor. This is especially true of various types of holiday trailers and of trailers that treat of a subject in which the requirements are common to all theatres.

SPECIAL TRAILERS

Since the outstanding efforts of the exhibitor are directed to the selling of his attractions, and at the same time, the character of the theatre as a purveyor of fine entertainment, the use of special trailers in the advance exploitation of pictures, heads the long list of effective uses of this medium.

Trailerettes and Headers

Despite the fine selling job done by the feature trailer in advertising individual feature attractions, an effort must be made by the theatre to establish its reputation for consistently good entertainment. One means of accomplishing this, is through the use of trailerettes, preceded by headers.

The trailerette runs approximately 7 to 10 feet in length, and consumes from 4 to 6 seconds of screen time. It is artistically prepared with photos of the stars, title of the picture, and listing of star names. Prepared as a stock item, to allow for extensive artwork at nominal cost to the exhibitor, the trailerette is designed for use with groups of other trailerettes, covering a full month or more of the theatre's attractions. For this purpose, groups of trailerettes are generally preceded by headers, featuring text similar to the following:

> We're bringing you a FEAST of FUN in NOVEMBER . . . with a series of joy-loaded programs, featuring the greatest HITS to come out of HOLLYWOOD! Drama! . . . Comedy! . . . Action! . . . All blended together in the tastiest dish of swell entertainment ever offered in one GREAT MONTH! Just look at what's COMING! (Follow with Trailerettes on the month's big attractions).

Or, in a shorter verison of the header, the exhibitor might use:

> You Ain't Seen Nothin' Yet! Just look at the great array of HITS scheduled for your pleasure!
> COMING SOON:
> (Follow with Trailerettes in a long series of Coming Attractions).

You will note that the second header, in addition to being shorter in text and, therefore, in length, omits the use of a specific month during which the attractions will be shown. This makes it adaptable to any group of pictures, covering split months or several months, and allows for the reuse of the header on subsequent occasions. The phrasing in the second header suggests that it should follow the feature trailers currently being shown, or should be run immediately after the feature attraction. The first header is adapted to showing at any spot in the program.

Trailerettes are also used with double effectiveness with Institutional Headers that extoll the theatre's policy, of providing consistently fine entertainment. For example, at the beginning of a new year:

> RESOLUTION!
>
> I (name of manager) hereby resolve that in the Year 1947, I shall bring to the patrons of (name of theatre) a selected group of the finest HITS produced in Hollywood. That, as in the past, the happiness of my patrons shall receive my foremost consideration . . . and that, to attest to my sincerity, I submit for your approval, a preview of some of the Great Attractions that will appear here soon, as a part of our New Year offerings: (Follow with Trailerettes on Big Pictures coming soon).
> 1946 was a great year for Hits . . . and we're happy to know that you folks enjoyed yourselves in this theatre . . . BUT . . . we've had an opportunity to look at some of the swell attractions scheduled for 1947 . . . and folks, they're TERRIFIC! Bigger STORIES! . . . Greater STARS! . . . more Wonderful entertainment than you ever dreamed the screen could offer. We haven't wasted a moment! . . . and we've scheduled the BIG ONES to play at this theatre . . . starting VERY SOON . . . and all year long! Just to prove that we're not whistling "Dixie" . . . take a look at what's on its way to this theatre: (Follow with Trailerettes on Coming Attractions).

Several times each year, an Institutional Header, pointing out the splendid entertainment policy of the theatre, should be run in conjunction with trailerettes on coming attractions. For example:

> During the past three months, we have had the pleasure to present for your entertainment, such excellent attractions as (List the Big Hits that have played at your theatre). Each of these Hits was the product of a major Hollywood studio, and featured some of the world's greatest talent. We know that you have been royally entertained . . . because . . . the pictures you have seen are acknowledged to be the Best Pictures of the Year! But, this is just a beginning! More fine productions are scheduled for release, and even now, are scheduled to play at this

AN EXAMPLE OF TRAILERETTE ART, in which the stars and the title of the pictures are given prominence. Trailerettes run from 7 to 10 feet in length (4 to 6 seconds of screen time) and are utilized by the theatres to herald the coming of an entire month's productions. Their greatest effectiveness is attained in the propagation of theatre policy and 'way-in-advance exploitation on products. Groups of trailerettes are generally preceded by headers.

SHORTIES are short subject trailerettes which round out advertising on forthcoming short subjects of special moment. These should follow the feature trailers on the programs in which they will appear. Theatres should maintain a supply of shorties on all of the short subjects that are booked, so they may be used separately if desired. These trailerettes are made on the same plan as the features and aid in building short-subject patronage.

theatre. It has always been our policy to present the BEST for our patrons . . . SO . . . in keeping with this rule, we call to your attention the long list of preferred entertainment coming soon to this theatre. (Follow with Trailerettes on Big Attractions).

Since your programs, more than anything else, attest to the policy and character of a theatre, it is rather obvious that almost any message that points up the theatre's prestige as a place of entertainment, can logically be followed by trailerettes.

Trailerettes are also available on serials, and are generally used as a week-to-week reminder of the next episode of the thriller that has a high box-office average to maintain for from 13 to 15 weeks, which it cannot do without advertising!

Trailerettes may be used to added advantage as cross-plugs, where an exhibitor operates more than one theatre in a town or nearby locality. Cross-plugs are trailerettes that carry a line at the top, reading, for example:

PRINCESS - NOW!

The Strand Theatre may then advertise the current attraction at its sister theatre, the Princess, so that patrons, having seen the attraction at the Strand, may attend the Princess on a subsequent day, when the Strand attraction is unchanged. The Princess may similarly advertise the Strand attraction.

This procedure may be utilized with regard to coming attractions as well, and regular trailerettes may be used, preceded by a head-piece (trailer preceding) reading:

Coming to the PRINCESS Theatre Sunday, for 4 Big Days. (Follow with Trailerette).

This procedure is especially desirable as an added piece of exploitation of a big picture.

For Short Subjects

In the trailerette family we also find shorties, trailerettes on short subjects. Containing the title of the short subject series, pictorial content, and a very short description of the series, shorties may be used to follow feature trailers, as a means of advertising the added attraction of these short subjects. Approximately 10 feet in length, they utilize very little screen time, and tend to add considerably to the volume of entertainment being offered in the coming attractions. A stock of shorties on all short subject series used by the theatre should be on hand at all times for this purpose.

Teasers

Having advertised the consistency of his fine entertainment as a policy of the theatre, the show-wise manager will select the top exploitation hits from the pack and pursue his screen exploitation campaign with teasers! Usually, this campaign is used to emphasize the biggest pictures on the schedule, but the rule-of-thumb that should apply to this procedure would be the selection of the pictures that lend to the best teaser copy. This suggestion, which might reasonably become controversial, is based on the fact that there are occasions when the very biggest hits offer little in the way of startling phrases or unusual plot, to lend to a really exciting teaser, whereas an otherwise unpretentious production might have some very timely or meaty angles, that lend inspiration to a powerful, curiosity-arousing teaser.

In view of the fact that it is unwise to attempt to run teasers on several pictures at one time, because to do so would be to eliminate the novelty of the teaser, which is one of its big selling points. The question is ever-present, whether it is wiser to lay exploitation stress on the smaller picture and build big receipts, or on the better picture and build bigger receipts. It would seem sound to take the stand that the teaser should be used where it most effectively justifies its investment. Obviously, the better the teaser, the greater is the justification. In any event, with a little thought, a good teaser can be written on any picture. Sensational teasers can be written on many.

In writing the copy for the teaser, it is important to keep in mind the purpose of the trailer. Its object is to tease! It should be written so that it whets the desire of the patron to know more about the picture and, consequently, builds up a suspense and curiosity which can only be satiated by the more complete sales-message contained in the feature trailer and, subsequently, the attraction itself. Accordingly, short, punchy ad-type copy should be used and in a short, trailer, packed with only the very important elements that will arouse the patron's interest. Where a single teaser is used, it should run for a week or more in advance of the regular feature trailer. Sometimes, several teasers are used in a series. In that case, they should be shown successively for several weeks prior to the feature trailer showing, or they may be spotted in several spots in the program during the week prior to the showing of the feature trailer, and again in the week during which the feature trailer is presented.

Several types of suggested teasers follow:

POSSESSED by the woman he married! OBSESSED by the woman he loved! Robert Young, Sylvia Sidney and Ann Richards . . . in "The Searching Wind" . . . A haunting Love Story! . . . charged with an exciting emotional experience! . . . to give you a Thrill you'll long remember! COMING SOON!

They LOOK alike!
They SPEAK alike!
They DRESS alike!
BUT . . . to the man they love . .
One is FIRE! . . . the other is ICE!
Bette Davis plays the BOTH . . . in "Stolen Life" . . . exciting you with Triple Dynamite! . . . starring
BETTE DAVIS in a Double Role . . .
DANE CLARK . . . a woman-taming artist . . .
GLENN FORD . . . sensation of "Gilda"!
Coming to this theatre SOON!

Something NEW has been added . . . to Eve's old APPLESAUCE! A tantalizing Bedtime Story about a "Night in Paradise" . . . with Merle Oberon doing the "TEMPTING" . . . and Turhan Bey doing the "TAKING" . . . in Walter Wanger's "NIGHT IN PARADISE" . . . The screen's most temptatious tribute to that sly old feeling! COMING SOON!

A series of three teasers (or more, if you desire) can be prepared, in the following manner:

LET YOUR HAIR DOWN, folks . . . for that 18th Century Barber . . . with a 20th Century wit . . NIT WIT! "MONSIEUR BEAUCAIRE" . . . starring merica's favorite cut-up BOB HOPE! Watch for him!

ON GUARD! . . . Prepare to meet the GAYEST BLADE who ever matched HOT STEEL with COLD FEET! . . . "MONSIEUR BEAUCAIRE" . . . artfully, uproariously impersonated by your funny-bone favorite . . . BOB HOPE! He'll be here SOON!

He's been to SINGAPORE! . . .
to MOROCCO! . . .
to ZANZIBAR! . . .
to UTOPIA! . . .
and NOW . . . he's in the KING'S HAIR!
BOB HOPE . . . as a Wag in a Wig . . . in a lather of LOVE and LAUGHS . . . as "MONSIEUR BEAUCAIRE" . . . Coming VERY Soon!

The foregoing are just a few ideas for teaser trailers. In most instances, the feature itself suggests the catch-lines and ideas for the teaser. In other cases, some timely theme, or current gag, lends itself to tie-in with the title of the feature or the story. If the line produces a spontaneous laugh, insatiable curiosity, or has a suspenseful or dynamic tingle, it will probably lend itself to the purpose of teasing the audience to follow your exploitation campaign, and ultimately, to see the picture. A line that suggests an intriguing sex-angle, while at the same time does not transcend the bounds of good taste, is generally sure-fire teaser material. Frequently, such a line is obtainable from the dialogue in the feature itself. In every instance, the teaser must pack a wallop to serve its purpose.

Endorsements

Several other types of teaser Trailers may be prepared in the form of "Manager's Endorsement Trailers" and "Money-Back Guarantees".

The endorsement trailer should be used on rare occasions, so that when it is used, it carries the ring of sincerity. To use it too frequently, would leave the impression that the manager is only too eager to endorse every film, for the purpose of inducing added patronage. The real purpose of the endorsement trailer is to add personal commendation to an extremely good picture, and at the same time to build up the patron's faith in the manager's recommendation of films. Accordingly, endorsement trailers should be limited to the very top attractions, where it is assumed that the picture will please a large majority of the theatre's patrons. Suggested text for an endorsement trailer, follows:

A MESSAGE TO OUR PATRONS
Rarely does the management of this theatre affix its personal endorsement to a motion picture. However, we have just previewed a film that promises to be the outstanding motion picture of the year . . . and we feel that we MUST tell you about it! It is (title of picture) . . . a picture that has everything you could desire in fine entertainment. Its superb cast, headed by (list stars) provide unforgettable performances; its amazing story will hold you spellbound with its brilliance; its masterful production and direction, combine, for your pleasure, poignant drama, artfully interwoven with the warmth of human emotions and the joy of living. The critics hail it "the greatest picture of our times". We are so impressed by what we have seen, that we are impelled to add our commendation to that of the critics . . . and to urge you to see it. It is with great pride that we announce the showing of (title of picture) (dates).
THE MANAGEMENT

A "Money-Back Guarantee" has the psychological effect of money talks. Accordingly, if you know your picture is going to please your patrons, back it up with a "Money-Back Guarantee", and tell your patrons from your screen. Run this trailer, or something similar, immediately following your Feature Trailer on the attraction you are exploiting:

You have just seen a preview of one of the greatest pictures of the year! We are so certain that this film will provide unsurpassed Entertainment for ALL our patrons, that we back up our convictions with a MONEY-BACK GUARANTEE! If, after seeing (title of picture), you honestly feel that it was not worth the price of admission . . . your money will be REFUNDED to you, if you will present your views to the Manager of this theatre. FULL ENTERTAINMENT VALUE . . . or . . . your MONEY BACK!
THE MANAGEMENT

Added interest in suspense-type attractions, can be obtained through the use of a trailer appended to the end of the feature trailer, as follows:

Due to the powerful, suspense-filled ending of (title of picture) patrons will not be seated during the last FIVE MINUTES of its showing.

To this, the following may be added, or used alone:

Tell your friends about (title of picture) BUT . . . don't reveal its suspenseful ending!

Newsreel Trailers

Newsreels, while considered sufficiently important to be a must on the schedules of most theatres, are seldom given the advertising support they merit. Of course, earth-shaking events cannot be made to order, so that every issue of the newsreel carries seat-selling material. However, many Newsreels, especially in these times of world reorganization, carry pictorial news that is definitely headline, and of great interest to theatre patrons. Short, explosive copy should be incorporated into a special trailer that will inform your patrons of the headline news that will be shown at the theatre.

A theoretical example would be this.

FLASH!
SEE: Actual on-the-spot motion pictures of the Hanging of NAZI CRIMINALS! . . . ATOM BOMB TRIALS! . . . MEAT SHORTAGE EXPOSE! . . . and MORE in Latest STRAND Theatre NEWS . . . Starting WEDNESDAY!

SERIAL TRAILERETTES form a week-to-week screen advertisement for use throughout the whole run of a serial. Atmospheric art and lettering, combined with an action photograph and star names are used in the serial trailerettes to maintain patrons' interest in succeeding chapters. Since programs attest the policy of the theatre, it is obvious that any message that points up prestige can be logically followed by properly selected trailerettes.

CROSS PLUGS are of especial value where an exhibitor operates more than one theatre in a town or a near-by locality. These cross-plug trailerettes are trailerettes of the usual type, but with some such message as "Now! At Princess" prominently displayed at a place on the frame where it does not detract from the message. The procedure can be used by all the associated theatres, and for attractions, whether such are current or coming.

Newsreels should be played-up constantly, as a part of every program, and, where theatres find it impractical to obtain information regarding the content of newsreels, in sufficient time to advertise them on the screen, institutional-type trailers can ballyhoo the newsreels effectively, as follows.

ON-THE-SPOT, Pictorial Reporting of LATEST NEWS EVENTS . . . on every program! SEE history being made at home and abroad . . . through the eyes of the NEWSREEL CAMERAMAN . . . covering every corner of the world . . . so that you can SEE these ACTUAL HAPPENINGS . . . On our Screen! Complete Pictorial News coverage . . . EVERY PROGRAM!

For Revivals

Revival shows have proved very successful as box-office stimulants. In many instances, these oldies are advertised just like any other feature attraction, with no additional fan-fare or explanation of why the theatre's policy of showing current attractions has been broken. It is the considered opinion of this writer that this procedure may tend to lessen the interest in the engagement, rather than increase it. Obviously, since it is common knowledge that patrons are eager to see the newest releases, it would naturally follow, that news of the showing of old pictures might be indifferently received by many potential patrons. On the other hand, if the patron is given a reason why the revival is being shown, and why he should want to see it, he would likely be induced to attend the showing. The following revival trailers illustrate the method of writing a trailer that provides a reason for the revival, and in doing so, explains why a previously disinterested patron should want to see it.

TSCHAIKOWSKY. . . . BEETHOVEN!... STRAUSS. The names of the Old Masters live on . . . because their works are deathless as masterpieces.
SO . . . we feel . . . Great Pictures live in the minds of those who see them . . . and create a desire to see them again. In keeping with this thought, we present the Return Engagement of TWO memorable screen masterpieces! Great, when you saw them First . . . they will thrill you anew in their Return Showing!

Our phone's been ringing day and night! In our LOBBY . . . on the STREET . . . EVERYWHERE . . folks have been asking for the return of their Favorite Movies.
SO . . . just to prove that we're here to PLEASE our patrons . . . we're Bringing 'Em Back . . . to Thrill and Amaze you . . . the CREAM of YESTERDAY'S Crop of Hits!
(Follow this trailer with trailerettes, two or more weeks in advance of showing; follow with feature trailers one week in advance).
(Follow with trailerettes for advance exploitation; and with feature trailers, one week in advance of showing).

Idea Shows

Retail merchandising (non-theatrical) has for years prospered by exploiting idea sales. They are better known to the layman as clearance sales, one-cent sales, four-star sales, fire sales, mid-year sales, pre-inventory sales, and the like. In retail merchandising, they are known as idea sales, because they present a reason for a sale, and then go ahead and have one. A "four-star" sale, for instance, would indicate that it is a sale of preferred bargains. The same store, on the other hand, would have its customers believe that it always offered "preferred bargains." Why then "four-star" sale? The answer lies in the proved advertising psychology, that people must be given a reason for believing that they are being offered an unusual value. The showman-like label "Four-Star" provides that reason, just as pre-inventory sale offers the implied reason that the store is sacrificing its merchandise, to reduce its bulk, and, therefore, to simplify the inventory. Contrary to the implication, most stores actually increase their stock, in anticipation of the tremendous amount of business this idea sale brings them.

Idea sales are used in theatres as well. A wild west show, for example, is an idea show. As a double feature program, featuring two westerns, it is just another program. As a wild west show, it is something to sell, and something which will get more business. Of course, once you make up your mind to label it a wild west show, you had better make up your mind to exploit the idea, or it will not do you much good. And then, it might be a good idea to add a couple of western shorts, just to emphasize the wild west flavor. Of course, being a good showman, you will make all the logical local tie-ups with schools, street ballyhoos, and the like, right down to the cigar-store Indian . . . and you will definitely want a special trailer on your screen to augment your feature trailers, by telling your patrons about the program as a wild west show. Here is one way of doing it.

YIP . . . EE . . . EE!
The wild and woolly West is coming to our screen . . . with BLAZING Six-Guns! . . . ROARING Action! . . . heart-stopping THRILLS! It's our nerve-tingling, hair raising WILD WEST SHOW . . bringing you a screenful of Daring Adventure! . . . (date) . . . with your favorite HEROES of the saddle . . . RIDIN' . . . FIGHTIN' . . . and SHOOTIN' their way to GLORY . . . in TWO pulse-pounding, action-packed Western Features! LOOK at these THRILLS! (Follow with feature trailers).

Other idea shows would include super laff shows (two comedy features), happy horror shows (two comedy mysteries), super adventure shows, and the like, even to something like this:

All The World Loves A Lover! . . . So, we're going to bring you a show that is Cupid's own selection on the Love Parade . . . at our SUPER SIGH SHOW . . . (date).
Two outstanding ROMANCES! . . . to quicken your pulse and fill your dreams! Two heart-warming hits that are filled with gay, irrepressible rapture!
Don't come alone! Bring your Best Girl, or that Man You Love! Everyone will be expected to hold hands, and THRILL to our SUPER SIGH SHOW (date). (Follow with feature Trailers).

Selling the picture is undoubtedly the most important job of the trailer, and smart showmen utilize its versatility in behalf of bigger box-office receipts. However, the role of the trailer in modern theatre management encompasses the selling of special events, holiday shows, good-will building, and various institutional pursuits, not the least of which is the establishment of decorum, in its presentations and institutional messages.

Leaders and Date Strips

In this category, the presentation leader, newsreel presentation leader and personalized date strips may be discussed as a unit, since they serve the same purpose, that is the establishment of dignity and good taste in the presentation of the program.

Presentation Leaders—There are many exhibitors who will spend thousands of dollars on fine appointments, tiled and mirrored lounges, deep pile carpets, luxurious settees, unusual lighting fixtures, and so forth, all for the purpose of creating a luxurious atmosphere and impressing their patrons. The same exhibitor, in many cases projects his feature attraction on his screen, without introduction or fanfare and overlooks the showmanship in taking credit for presenting latest news events, and considers a date strip a necessary evil that can not earn him a dollar anyway.

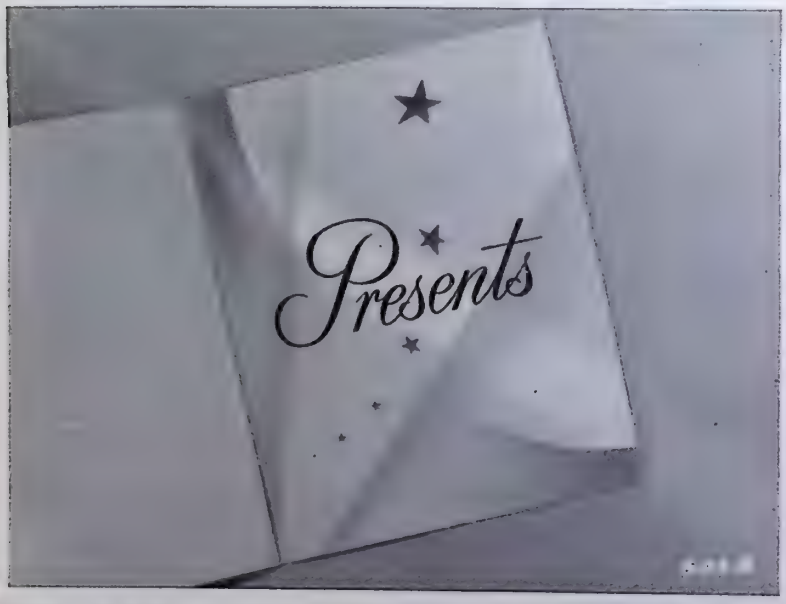
He will exercise the good judgment to raise the dickens because one of the two thousand lamps in his marquee has taken unto itself a blackout, but will run his date strip down to where it is nothing more than a short flash and does not inform half of his patrons of the exact day on which his coming attraction is playing. He is a smart operator in many ways, but he just overlooks many important items that don't seem important at the time.

The smart exhibitor looks at it this way. "The picture was made in Hollywood, and Hollywood—the producer, the stars, yes, even the cameramen, make-up men and costume designers—get billing. Why not my theatre?" A good question, which he answers by ordering a finely produced, animated presentation leader like the one pictured here. Mind you, he is not trying to take the credit away from anyone billed in the feature. But, he is going to get some top billing for his theatre, and he does it in a big and impressive way. Though the attraction may have played all over the United States before being shown in this theatre, the audience is now informed that the Strand Theatre Presents its feature attraction, which is just another way of saying that the theatre is darned proud to present the attraction, that if the Strand Theatre is proud, the audience will be glad it came, and that the attraction can be darned proud to be presented at the Strand Theatre! All that, for less than what the exhibitor spent on the sand-jar standing in a dark corner of the foyer!

Do the same thing for your coming attractions. (See illustration.)

Newsreel Leaders—Having proved to himself that this little piece of business about personalizing the presentation of his feature attraction, has added prestige

SPECIAL LEADERS for feature presentations and newsreels, as well as personalized date strips, can promote good will. Here is indicated the use of single style openings carrying the theatre's name (504A) animating into a presentation for "World News" (504B). The alternate (504C) can be combined to show the theatre name, animating into "Feature Presentation." It is recommended the same leaders be used for both feature and newsreels.



PRESENTATION LEADERS serve the purpose of establishing the dignity and good taste of a theatre's management. There are many exhibitors who spend thousands of dollars on fine appointments, deep-pile carpets, luxurious settees, unusual lighting fixtures, and the like, but who project the feature attraction without introduction or fanfare and overlooks the showmanship in taking credit for presenting the show. The smart exhibitor does not.

to the theatre, our friend, the exhibitor, wonders why it would not do the same thing with the newsreel. Sure, the newsreel company shot the film and gets the credit, but who paid for it? and who is presenting it to the patrons? Right! The man goes out and buys himself a newsreel presentation leader (see illustration) and the patrons are then duly impressed with the important fact that the theatre is responsible for the presentation of the news events of the world, and the manager takes a bow.

Now, about that date strip!

Date Strips—That short strip of film tells a mighty important story. It tells your patrons when the attraction will play at your theatre. Of course, you can go ahead and spend your money effectively advertising your feature, so that your patrons want to see it and then find that, because your date strip was sadly cut-up from extensive splicing, so that the short flash of the date was not enough to impress them, they went out and played gin rummy, because they did not know the picture was playing at your theatre that night. The answer to that one is keep your date strips freshly renewed at frequent intervals. And, while you are about it, inject a little showmanship into them!

Personalized date strips contain the showmanship you require, to add prestige to the presentation of your coming attractions, and more indelibly to impress the date upon the minds of your patrons. They carry your theatre monogram in a corner and your slogan at the bottom of the strip, thereby keeping all date strips uniform. The space for date changes can be utilized to suit your needs. Whether you are a monogrammed shirt addict, or not, you will certainly appreciate the importance of these snappy, monogrammed personalized date strips. (See illustrations.)

If you would like to receive your personalized date strips free, or perhaps even make a profit, tie up with a local newspaper. Special date strips are prepared for this purpose (see illustration) and newspapers are generally amenable to the suggestion that they pay for a set of date strips, in return for the advertising they receive. The advertising you give them reacts in your favor, however, because it reminds your patrons to consult the newspaper for daily information regarding your program. This tieup may be utilized in many ways, including asking the newspaper for free space for your ads, in return for their ad on your screen. Try it!

Music and Decorum

The subject of decorum in the theatre can not be dismissed without reminding the exhibitor of the importance of music for intermissions and exit marches, and goodnight trailers. Music is available on regular sound track.

An intermission can be an embarassing interlude, if it is allowed to fall flat for lack of music. On the other hand, bright, snappy music maintains the entertaining atmosphere your program has built up. Remember, that many people remain after the intermission to see the balance of the show. Unless you keep the atmosphere alive with music, their mood is going to suffer, and they will obtain less enjoyment from your program. By the same token, let them have music at the close of the show, so that they are of a frame of mind to induce them to return.

Goodnight trailers perform the duties of a gracious host, in bidding adieu to patrons. A selection of delightful goodnight trailers are available, appropriately scored as befits their function. Special production has been accorded these trailers, which are in the category of stock special trailers, although they can be made to the exhibitor's individual requirements. As has been explained before, the stock trailer provides an economy for the exhibitor.

Equipment Trailers

Theatre management no longer limits its function to the exhibition of a motion picture. Advancements in standard of living, architectural design, comforts and merchandising, have created a highly competitive atmosphere among theatres, to keep pace in providing patrons with every possible service to insure their physical and mental comfort and thereby to afford greater enjoyment of the attractions. Technical advancement in the fields of projection and sound have also contributed materially to this effort. Today, an exhibitor finds himself far behind his competitors unless he has taken care

to provide a beautiful front for his theatre, attractive marquee, lobby, foyer, lounge comforts, comfortably designed seats, and, above all, suitable facilities for bright projection of his picture and efficient reproduction of sound.

In addition to these physical comforts, the exhibitor find it necessary to render many additional comforts, such as parking facilities, free checking service for parcels, public telephones, page service, shopping bags, umbrella covers, and an unlimited number of small services that add up to patrons satisfaction and dollars-and-cents in the box office.

Having rendered these services, many exhibitors assume that these services sell themselves to the patrons. Indeed, many of them do. In fact, it is probably true that every patron is particularly conscious of some of the services rendered. On the other hand, it is doubtful if all the patrons are conscious of all the services being rendered, and, even if they were, advertising these services, just calling them to the patron's attention, would increase his awareness of the added convenience placed at his disposal. Here, the trailer plays another important role in management, and one that through its propagation of the efforts expended in behalf of the patrons' comforts and conveniences, justifies the huge sums expended for the elaborate structures, appointments and equipment in the modern theatre. Truly, the trailer, through the expenditure of pennies, makes a box-office attraction of the investment of thousands of dollars!

Many manufacturers and distributors of theatre equipment have shown their appreciation of the good to be derived from trailer advertising by providing a trailer informing patrons that their product has been installed in the theatre. The theatre is asked to run the trailer, which is paid for by the manufacturer or distributor. It is suggested that, when an exhibitor builds a new theatre, or remodels his present theatre, he should insist that the manufacturer provide a trailer for this purpose. There should be little difficulty on this score, because both the theatre and the manufacturer benefit, and the cost of the trailer is so small that it can never become an issue.

Let us assume that the theatre installs new seats, thereby replacing old, worn seats that have been the bone-of-contention with their patrons for several years. The patron should be told about it! For example:

> NOW, you can see our attractions in the comfort of new, AIRFOAM CUSHION SEATS . . . the latest innovation in theatre seating! NO SPRINGS! NO PADDING! NO LUMPS! Just thick, air-celled RUBBER! . . . luxuriously cushioning your visit to this theatre! More comfortable than your Easy Chair at home! Installed by Movie Seating Co., AIRFOAM CUSHION SEATS are just one of the conveniences offered our patrons. We know you'll like them.
>
> THE MANAGEMENT

A new sound system really calls for plenty of ballyhoo, and the manufacturer will be happy to accommodate you with a trailer that sells it to your patrons. Theoretically, it would be something like this:

> Newer, Better, SOUND has been provided for our patrons! The new, rich tones, you have discovered in the sound to which you have been listening, are due to the latest scientific achievements in sound engineering . . . made possible through the installation, in this theatre, of EASTERN ELECTRONIC LENSOPHONIC SOUND . . . Bringing you faithful reproduction of the complete range of sound and music, as recorded in Hollywood Studios and played by the nation's top orchestras.
>
> The tremendous investment represented by the installation of this latest equipment, is an investment in Better Entertainment for YOU, our patrons. Your pleasure is our goal . . . and we assure you that this theatre shall always procure for your enjoyment, the finest entertainment and most modern facilities available.
>
> THE MANAGEMENT

Similar trailers should be run to announce the installation of a new screen, new carpeting, redecorating, or any of the hundred and one improvements that take place in the maintenance or refurbishing of a theatre. Don't run them all

OTHER PRESENTATION LEADERS introduce newsreels and coming attractions and are a must with exhibitors who desire to individualize presentation of their attractions. In these two pictures are seen an artistically prepared presentation leader to precede any type of theatre presentation. This leader is in excellent taste and animates from the theatre name to the word "Presents," backgrounds dissolving one upon the other in pleasing succession.

NEWSPAPER TIEUPS, with personalized date strips, showing the newspaper's name superimposed over the date strips in place of the theatre's slogan, can be used to advantage. This procedure may prove profitable, with screen space being sold to the newspaper; or the same thing may be accomplished on a reciprocal advertising arrangement. Newspapers are generally amenable to the suggestion that they provide such a set of date strips.

at once! If there have been several major improvements, combine them all in one trailer; or, better than that, run a trailer on one subject for a week; on another the next week, and so on, repeating them occasionally to refresh the minds of your patrons. Short, refresher trailers should run periodically, to constantly remind your patrons that you provide them with the finest facilities for the enjoyment of your shows: For example:

> This theatre is equipped with **EASTERN ELECTRONIC LENSOPHONIC SOUND**, the most modern, scientific advancement in sound engineering! Providing faithful reproduction of oral and instrumental sound! A **STRAND THEATRE** Service!

The advertising of new equipment, improved facilities, appointments, and other improvements that serve your patrons are an important phase in the advertising of your theatre and your service as a whole. It does not make sense, than an exhibitor will spend possibly $75,000 on an air-conditioning system and fail to spend $3 to $5 for a trailer that reminds the folks that it is warm outside, and the cool atmosphere inside the theatre is specially prepared for their comfort, as a service of the theatre. It does make sense, dollars and cents, for the theatre to remind the patrons that the uncomfortable heat of summer can be overcome, while enjoying excellent entertainment and relaxation in the theatre that provides both, by virtue of scheduling Hollywood's biggest hits, and the installation of comfortable air conditioning. A typical example of the type of trailer that brings patrons back to an air-conditioned theatre, follows:

> Guard Your Health! **KEEP COOL!** See A Good Show! This house is **AIR CONDITIONED!** . . . which means that the temperature is neither too **HOT** nor too **COLD** . . . That you may walk into this theatre from the heat and humidity outside, and not suffer from the sudden change . . . That the air is conditioned to your bodily comfort, automatically-scientifically, in this **AIR-CONDITIONED** theatre!

Theatres using washed-air type of cooling, can approach the selling of cool comfort, from another angle:

> This theatre used the **WASHED-AIR** type of Cooling System, to provide **HEALTHFUL COOLNESS** all summer long! There is **NO** shock! . . . **NO** chill! Washed-air is used in Hospital Nurseries to safeguard the health of **INFANTS** . . . because it does **NOT** Refrigerate the air! **RELAX** in this **COOL**, healthful theatre, and enjoy our fine programs!

Another very important angle on which washed-air users can capitalize, is an appeal to hay-fever sufferers, of which there are hordes, in most situations:

> **HAY FEVER SUFFERERS** can be assured of real enjoyment and comfort, by attending this theatre. Our **WASHED-AIR** Cooling System thoroughly **WASHES** and **FILTERS** the air of Hay Fever Pollen . . . bringing relief from Hay Fever . . . and providing greater enjoyment of our selected programs.

In addition to the major services rendered by the theatre, as represented by sound, projection, seats, air-conditioning, and other improvements in equipment and appointments, modern management dictates that the aggressive theatre manager provide related conveniences, to encourage increased patronage and goodwill for the theatre. Among these are free parking facilities, parcel-checking service, and other obvious services that enhance a patron's visit to a theatre. The suggested trailers that follow in themselves explain a few of these courtesies and how the text may be handled, so that they attain maximum effectiveness:

> Don't worry about **PARKING**, when you visit this theatre. Patrons are invited to park their cars, absolutely **FREE**, in our **PARKING LOT**, adjoining the theatre. Be sure to obtain Parking Coupon from attendant . . . and have it stamped at the box-office, when purchasing an Adult Admission Ticket. Another service for **STRAND THEATRE** patrons!

> **FREE PARCEL CHECKING SERVICE!** When shopping, or otherwise burdened with bundles . . . visit this theatre and **RELAX** with our fine programs . . . while an attendant checks your bundles. **FREE PARCEL CHECKING** is another special service for **STRAND THEATRE** patrons!

> Our program is your Guide To Better Entertainment! Leave your name and address at the box-office . . . and our **PROGRAM** of Hit Attractions will be mailed to you **WEEKLY**!

> Do you wish to make a Phone Call? For your convenience, a **PUBLIC TELEPHONE** has been provided, in the **LOUNGE**. Please Limit Your Call so others may avail themselves of these facilities. Thank you.

> If you expect an urgent call during performance . . . kindly obtain a **PAGE SLIP** at the box-office, so that you can be easily located by an Usher. We must refuse to Page orally, because it disturbs our patrons. Your cooperation is appreciated.

> Visit this theatre, **RAIN** or **SHINE**! As an added service, Free **UMBRELLA COVERS** may be obtained from our Doorman, so that your clothes will be protected from your damp umbrella while you are enjoying the show. Another **STRAND THEATRE** Service!

> **VANDALS**, who destroy property, are Bad Neighbors, and **UNWELCOME** patrons. Any persons apprehended in the act of destroying theatre property, will be prosecuted by law. The cooperation of law-abiding patrons, in reporting such acts of Vandalism, will be greatly appreciated . . . and will assist us in properly maintaining this theatre for your maximum pleasure. Thank you.
> **THE MANAGEMENT**

Good-Will Promotion

Ideal use of the special trailer, for the purpose of promoting good-will and at the same time advertising improvements, is in the course of remodeling efforts which render the theatre temporarily unpresentable, and inconvenient. An apology for the condition of the theatre, with information regarding the reason for its upset state, and a preview of what it will accomplish in comforts for the patron, goes a long way toward overcoming patrons' irritability, and serves as advance advertising for the remodeled theatre. Theatres that were caught with their maintenance down, when the war started, and, because of restrictions, have been unable to make sorely needed repairs, would do well to include a thank-you tone to the trailer for the patrons' continued patronage despite the conditions. For example:

GOOD NEWS for our patrons! With Wartime restriction lifted, we're starting our Reconversion Program! We're throwing out the patchwork and making everything NEW . . . from Floor to Roof . . . New seats . . . Re-painted Walls . . . Re-decorated Lobby and Lounges . . . and many other grand improvements. The general refurbishing will have things underfoot for awhile . . . but we know you won't mind . . . because . . . it'll be finished soon . . . and then you can enjoy our consistently fine entertainment in Luxurious Comfort and perfect Relaxation! We're grateful for your patience and consideration, during the war years . . . and happy that we have this chance to make it up to you with a swell New Theater, that will make the long wait worthwhile.

THE MANAGEMENT

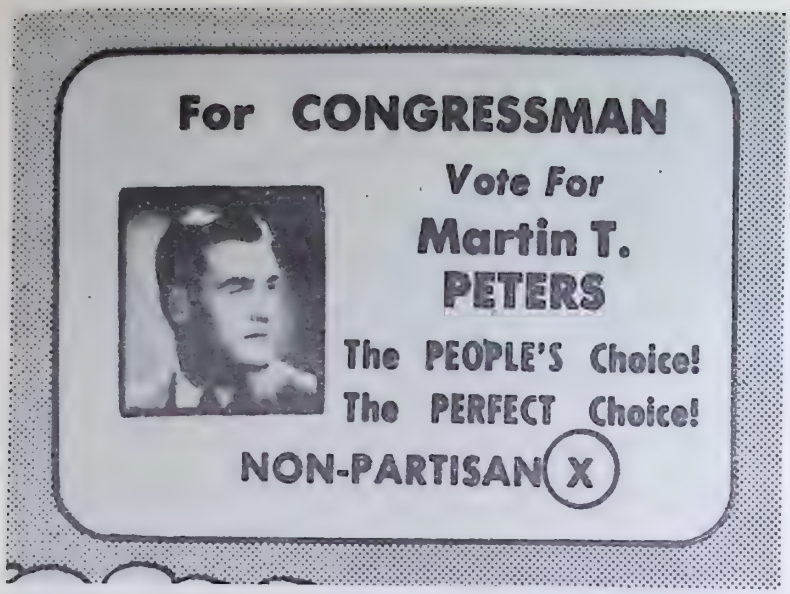
An Atomic Bomb Did NOT Hit This Theatre! We're in the midst of Remodeling . . . and, of course, we're a little upset . . . what with painters, carpenters, etc., cluttering up the theatre with their tools. However, we are sure that you folks will understand, and forgive this inconvenience, when you see how nice everything will look when completed. Thanks for your indulgence.

Institutional Advertising

One of the most important functions of the special trailer is institutional advertising. This oft-neglected phase of theatre management has been subjected to considerable controversy and a healthy belaboring of pros and cons. Most of the anti-institutional advertising arguments are based on the contention that advertising should be confined to product, because only good pictures bring business. Those in favor of Institutional Advertising, advance the need for establishing a liking for the theatre and good-will for the management, and the writer makes unqualified admission of his faith in the value of both types of advertising.

As an illustration of the importance of institutional advertising to the theatre, let us place the theatre in the category of a man applying for a position, in almost any line of endeavor. Let us assume that he has provided his prospective em-

PERSONALIZED DATE STRIPS provide dignified presentation of dates accompanying previews. Here, A, B, and C give a good idea of the effectiveness of the monogram and theatre slogans combined with the date. Date strips express the theatre's dignity and individuality and are becoming more popular every day with theatremen throughout the country. Personalized date strips give the impression the whole show is really the theatre's own.



POLITICAL TRAILERS provide extra revenue for theatres. Illustrated here indicates a sample of the trailer to be run for local political candidates. Candidates from all parties may advertise on the same screen with special trailers indicating that such advertising is paid advertising and does not necessarily reflect the views of the theatre management or any of the theatre's attaches. Up to 15 words and picture can be put on a single film frame.

ployer with samples of his work, and has, on the basis of ability, qualified for the job. Essentially, that is what the employer was looking for. A man who could handle the job. However, we would consider the employer lacking in discernment and good judgment, if he did not also consider the character, integrity and general qualifications of the applicant, with regard to his intelligence and adaptability to the firm's policies and methods of administration and operation.

Does this seem too far-fetched for a simile? It should not, because theatres have individuality and character, as well as good product (ability). Through institutional advertising, the theatre drives home to the patrons the inescapable fact that the management has a stake in the welfare of the community it serves. It establishes its policy of good entertainment, not by individual pictures, but by its entertainment policy as a whole. It sells its patrons motion pictures as a means of relaxation. It establishes in the minds of its patrons a faith in the good intentions of the management and in its ability to deliver consistently good attractions in a wholesome and comfortable atmosphere. It makes regular patrons of the folks who go to the movies and it makes movie-going a greater pleasure. It is the reason why you patronize one barber, why your wife does most of her shopping with one grocer (though he probably carries the same standard brands available in almost any store), and why theatres have patrons who attend their performances week after week, frequently without even knowing the name of the attraction being shown.

Of course, you can not get the full value of institutional advertising by running a special trailer once a year or at too-lengthy intervals, anymore than you can make friends by smiling only on rare occasions. You must create an attitude which can be interpreted by your patrons as friendly, honest and forthright. and you can do this by expressing yourself through special trailers which tell the patrons that your programs are consistently good (and backing it up with your product), pointing out the merits of the motion picture as an entertainment medium, and reminding them at frequent intervals that their patronage is welcomed by you and is the inspiration that impels you to bring them better films, more comfortable accommodations, and better service. These expressions make articulate, the character of a theatre, and inspire the confidence and good-will of its patrons. These things add profoundly to the all-important selling of your product!

Beginning with the opening of your new or remodeled theatre, you start the institutional campaign for friendly patrons, with a dedication trailer, something like this:

> Welcome To The New STRAND THEATRE! We take great pride in the debut of our new theatre . . . and hope you like us. No expense has been spared to make the STRAND, Podunk's finest place of amusement. From sidewalk to screen; from roof to floor, every modern comfort and convenience has been provided for YOU, our patrons. The cream-of-the-crop of Hollywood's greatest HITS have been scheduled to entertain you, within these walls . . . and it is our hope that your visits to this theatre will bring you many hours of happiness and pleasant memories. The management of the STRAND Theatre has dedicated its policy to the citizens of this community. Your wish shall be our command. It is to please YOU . . . all of you . . . that the STRAND THEATRE stands today, a place to come for superb entertainment, in a wholesome and friendly atmosphere that will bring you greatest pleasure. We take this opportunity to thank you for your good wishes and support, as evidenced by your attendance, and to extend an invitation to come often . . . to the STRAND.
>
> THE MANAGEMENT

Then you can do a dedication job every year on your Anniversary and keep this special type of institutional advertising on the credit side of your ledger once-a-year, forever. The answer is an Anniversary Trailer, something like this:

> We're Having A BIRTHDAY PARTY . . . and you're ALL invited! Yes folks, next Thursday, the STRAND THEATRE celebrates its FIRST BIRTHDAY . . . with a BIG, SPECIAL BIRTHDAY SHOW, and some grand Surprises! We want all of you to be here . . . because most of you welcomed us to Podunk, and helped us get acquainted. We've tried mighty hard to live up to our promises to give you better entertainment in comfortable surroundings . . . and we hope that now that we're a year older we can stand on our record as having "delivered the goods". Now that you know us better . . . and we know you . . . we feel sure that, between friends, we can tip you off to some of the great entertainment that we're going to give you in the coming year. Well, we're going to tell you about it . . . at our BIRTHDAY PARTY, next Thursday . . . so PLEASE be present . . . and start out the Big Year with our Tremendous Birthday Show! Thanks for a wonderful year! There are more to come! And . . . Thanks folks, for liking us as we like you.
>
> THE MANAGEMENT

There are several approaches to the birthday party plan and the foregoing trailer could obviously be divided into two trailers, one to be run a week in advance of the party and the second the week of the party. However, for the purpose of acquainting you with the subject, we have included the announcement of the party along with the Thank You, which is good public relations. Use it, and you will make friends for the theatre!

Product advertising assuming the dominantly important position in your schedule that it does, it is important to keep your patrons aware that your theatre provides consistently good motion pictures and that motion pictures provide more entertainment for less cost than other mediums. This should be accomplished by frequently running trailers that extoll the virtues of the motion picture, and by propagating your theatre's efforts and record for the presentation of the Best entertainment. Here is an example of how it can be done:

> The A. B. C's of Good Entertainment!
> "A" stands for Arithmetic
> so difficult at times,

When for pleasure, you just have
a very few thin dimes.
"B" is for the Better form of
Entertainment choosing,
It's Movies, every time, you know,
If you would shy from losing.
"C" is for the Change you get from
precious Dollar Bills,
The Movies give you more, of course,
and hours and hours of Thrills!
So . . . impress upon your budgets,
folks,
This simple education . . .
The Movies are your Best and
Cheapest
Form of Relaxation!

You'll find prefect relaxation and outstanding entertainment, at this theatre, throughout the year. A good **MOVIE** is the perfect antidote for frayed nerves, hard work, serious problems. It carries you away to distant lands, adventure, romance and comdey. It helps you live the lives of other people . . . and to forget your cares. Movies are the finest entertainment for every member of the family. In this theatre, each picture is carefully selected to meet with your approval. Attend the movies regularly. See our Big Hits!

HELLO NEIGHBOR!
Welcome to the **STRAND THEATRE!** Every night is **FAMILY NIGHT,** and our programs are carefully selected to appeal to every member of the family . . . young or old. We are proud of our record as members of this community . . . and of the part we play in all civic activities. **PODUNK** is a grand town, filled with grand folks, and we feel that you are **MORE** than patrons . . . you're our **FRIENDS!** That's why we exercise greatest care in providing the kind of entertainment you'll enjoy . . . because we want to keep our friends . . . and remain an asset to the community. Make the **STRAND** your haven for supreme relaxation and entertainment. Everything possible is being done to provide for your comfort and pleasure. Thanks for your patronage. Come often. You're always welcome.

THE MANAGEMENT

The **STRAND THEATRE** is proud to be a part of this community. We are members of:

KIWANIS CLUB
CHAMBER OF COMMERCE
MERCHANTS ASSOCIATION
BETTER BUSINESS BUREAU
LIONS CLUB
ROTARY CLUB
GREATER PODUNK FUND
ASSOCIATED CHARITIES

and other organizations that contribute to the welfare and prosperity of **PODUNK.** This theatre has faith in **PODUNK** and in its citizens.

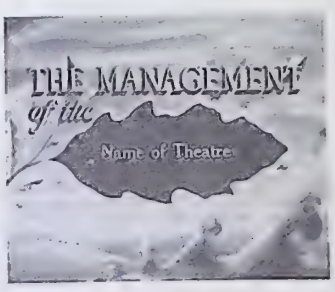
THE MANAGEMENT

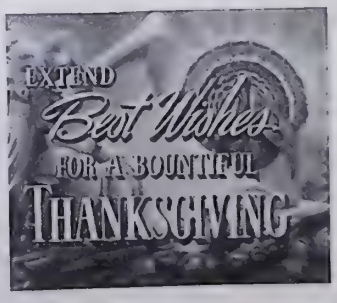
While you are garnering good-will for your theatre and establishing its character with your patrons, you will find it important to take more than a passing interest in civic activities, and in community life. One of the most outstanding of these is the church, which probably possesses more influence with your patrons than any other single medium. By running a trailer that encourgaes church-going, you not only make a friend of the church, but also, of the good citizens of your community, whether or not they are church-goers. Your action definitely attests to your interest in community welfare, and is an effort of which you may be proud. For example:

In the building of our nation . . . in the moulding of its high ideals . . . in the advancement of its people . . . in the center of its very life . . . there has always stood the **CHURCH,** to inspire and bless. It stands in our community today. It invites you to its services. **GO TO CHURCH** somewhere, Next Sunday.

Foremost of American institutions is the **CHURCH.** Upon its religious doctrines rests the course of man-

SEASONAL GREETINGS offer a possible source of revenue to theatres. There is plenty of good business in community cooperation. One of the great cash and good-will opportunities is present around holidays, when such presentations as those illustrated can be sold and shown. These trailers feature a joint greeting from the management and local merchants and professional men, followed by all those participating with the theatre in the deal.





kind. Visit it regularly. Be sure to GO TO CHURCH on Sunday.

With a little thought and a display of interset in the civic activities of your community, you'll find plenty of opportunity to win good will for your theatre by running institutional trailers. Safety campaigns call for your assistance from the screen. Boy scout and girl scout anniversaries and local activities get plenty of good will from the boys and girls and from their parents, if you call attention to them with trailers. Drives for funds, benefits, support for veteran's organizations, housing programs, and job assistance rate you highly in the eyes of local citizenry. In other words, your theatre can become the town's first citizen if you will do just what a man would do to earn that recognition. That is the way to sell the theatre to your patrons and that is the way to sell them your pictures. You do business with the fellow you like, and they will do business with you, if you make them like your theatre

Cooperative Advertising

There is plenty of good business in community cooperation and plenty of it is on the line. For example, when the kids graduate from school, congratulate them from your screen. Then, sell gift books as graduation gifts, tie-up with the merchants for a screen advertisement, whereby the merchants join you in greeting the graduates, and charge enough for the screen ads, over and above your cost, to bring you a nice profit. Run a special show for the graduates and promote gifts from the merchants. Give the merchants advertisements on your screen, in return for the gifts. Stage weddings, beauty contests, baby contests, Mother's Day celebrations, Hallowe'en shows, April fool shows, and countless other promotable holidays and exploitation dates lend to showmanship from your screen, with special trailers, and get community good will. The observance fo these dates is worth more than the immediate boxoffice receipts because you strike a familiar note with your patrons' interest in these dates, and cement the bond of friendship and good-will that exists between people who have things in common.

Kiddies' shows are a definite need in every community and the wise showman will not only appeal to the good-will obtainable from this type of venture, but will do a whale of a business as well, if he is careful in the selection of his pictures, ties up with educational authorities, parent-teacher organizations and civic leaders, and tells his patrons about them from his screen.

One of the great cash and good-will exploitation opportunities is present around holidays. At Eastertime, a tribute to the holiday from your screen shows consideration and cooperative community observance of the date by the management of the theatre. The same applies to legal holidays honoring great presidents, Memorial Day, Independence Day, Labor Day, Thanksgiving, Christmas and New Year's.

A few examples of the types of messages that win good-will from your audience, on these occasions, follow:

EASTER GREETINGS
To Our Patrons
The Management and Staff of this theatre, take this opportunity to wish you and yours a HAPPY EASTER . . . and health and happiness throughout the year. EASTER GREETINGS.

MEMORIAL DAY, 1947
With heads bowed, we silently offer humble prayer for those whose memories we honor on this MEMORIAL DAY. It is for us, the living, to hold high the sword of justice and liberty for which they gave their lives . . . that we may not have given them in vain. Their deeds shall ever hallow this Day. MEMORIAL DAY, 1947

THANKSGIVING, 1946
On this Thanksgiving, we sum up the Blessings of Freedom and Security that have made this a Great Nation . . . and humbly offer our Thanks to God for the peace so recently restored to the world. The abundance of opportunity to secure the Future of our Families and Ourselves . . . our Homes and our Country . . . is a testimonial to the American way . . . for which we are ever grateful.

Christmas and New Year's holiday greeting trailers, are used so extensively by theatres throughout the country, that elaborate production trailers are prepared for these occasions, containing a wealth of animation, frequently live shots, a stirring and appropriate message, and carefully chosen music. These holiday trailers are good-will musts with most showmen and they contribute greatly to the theatre's holiday atmosphere and appeal. It is the management's method of using the screen to wish patrons "Happy Holidays," a friendly custom that is a part of American life.

Holidays have their cash value, too—trailers prove an important source of revenue. Outstanding among these are the merchants greeting trailers. These trailers feature a joint greeting from management and local merchants and professional men, followed by ads from all those participating with the theatre in the greeting. The greeting trailer and merchants ads are nominally priced, whereas merchants will pay a considerable fee for the privilege of having their names flashed on the theatre screen. The profits are great and merchants welcome this opportunity to join the theatre in this good-will venture. Particularly noteworthy is the fact that many professional men, whose callings bear a code of ethics that precludes the use of advertising, will be amenable to participating in a greeting to the theatre's patrons. This opens an extra avenue for added revenue.

Merchants greeting trailers have proven highly effective as good-will builders and extra income for many years and find increasing use among theatres each year. Their most logical use is immediately following the theatre's holiday greeting trailer, which sets a mood that makes the merchants' advertising even more acceptable to the audience. Audiences react favorably to this type of screen advertising because of its local flavor and the message it supports.

It is good business to use Merchants greeting trailers for Thanksgiving and for the Christmas-New Year's holidays. Logically, rather than do a double selling job, the theatre manager should endeavor to sell the merchants ads in a package. In other words, instead of selling the ads for $5 each for Thanksgiving greetings, and again for $5 for the Christmas-New Year's Greetings, he can sell the merchants, in one call, ads for both sets of Greetings for a package price of $8.50 (the prices shown are theoretical, varying according to the situation). This enables the merchant to save money on the advertising and saves the manager an extra call and an extra advertisement, since he can use his Thanksgiving group of merchants ads for his Christmas-New Year's greeting as well.

Another source of revenue for the holidays is gift books. Admission gift books are available from most firms that print theatre tickets and vary in style and denominations. They insure attendance on the number of admissions represented in the book or their equivalent in cash, and persons holding gift books are induced to attend the theatre at which they are valid rather than spend the cash for another theatre. Accordingly, gift books induce extra admissions to the theatre and, through the selling job done by trailers on these occasions, bring the patrons back again and again. A typical trailer suggesting gift books as Christmas gifts follows.

Do your Christmas Shopping EARLY! Buy Gift Books of admissios to this theatre . . . and give them as Christmas Gifts!
No Gift will be more appreciated than one that affords Golden Hours of Entertainment.
Gift Books are On Sale Now, at our Box Office . . . in denominations of $3 . . . $5 . . . $10 . . . The Ideal GIFT for Young or Old . . . Buy Them TODAY!!

Of course, every holiday lends itself to extra exploitation and added revenue through give-aways, special shows, special matinees, and sundry activities that are properly sold to the patrons with special trailers. Every Holiday should be an excuse for an idea show based on the holiday theme. Your regularly scheduled program takes on added stature and significance when you run a trailer that announces it as a special holiday show—"Star-Spangled Fourth of July Show," "Thanksgiving Feast of Fun," "Special Christmas Package of Joyful Entertainment," or some other alliterative caption which gets over the idea that the show is something special and out-of-the ordinary. That is institutional advertising and product exploitation at the same time. Holidays are box-office days to exhibitors who use special trailers to tell the story.

One of the specialized uses for special trailers, and one that is frequently overlooked, is in connection with the sale of

confections, income on which has become a very sizable item in modern theatre management. In many instances, companies which supply candies and popcorn to theatres take the initiative and provide trailers at their expense to increase sales. Where this is not done, many exhibitors show their awareness of the screen as a selling medium and advertise these extra profit items themselves.

Extra Profits Promotion

It is quite logical that the patron interested in a movie may be induced to purchase candy, popcorn or a soft drink is suggested to do so by a special trailer on the screen. Intermission provides splendid opportunity for this suggestion, and the break in a show, where an intermission is not provided, offers next best spot for this selling job. A few of the simple messages that help to build up profits on confections, are shown here:

Try a tasty CANDY BAR for extra enjoyment of the show. Candy is healthful and nourishing. Available at the CANDY BAR in our lobby. Always FRESH! Always DELICIOUS! Get a CANDY BAR, Now!

Win a Free Pass to this theatre! Buy a Bar of Delicious CANDY, from our CANDY MACHINE, in the foyer. If you're LUCKY, your Candy may be accompanied by a Free Pass to this theatre. You CAN'T lose . . . because the CANDY is always Fresh and Tasty . . . and the passes are plentiful.

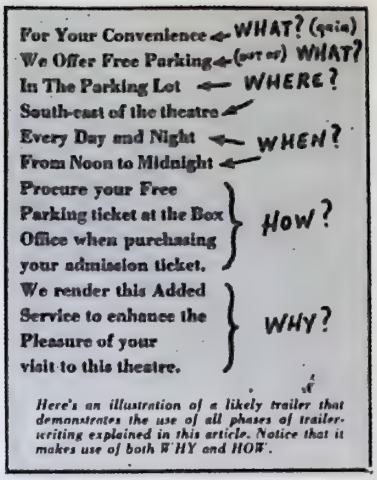
Fresh, luscious POPCORN is ready! Just popped, in the machine in our lobby. Get yours NOW . . . and add delicious FUN to your show-going!

Thirsty? Refresh with a cold, delicious soft drink, available from the dispenser in our foyer. Cool, Tasty, Terrific! It just hits the spot!

COPY PREPARATION

Many more pages of example of how special trailers can be used to great advantage in modern theatre management, could be written and endless suggestions could be given, but, to the exhibitor who has read this far, the specific needs fo his theatree will readily suggest the type of trailers he requires, and should assist him in their preparation.

So that the exhibitor may become acquainted with the newest approaches, copy ideas, trailer trends, and with current exploitation and service opportunities presented by the use of special trailers, National Screen Service publishes and distributes monthly its publication, Mister Showman, which conveys up-to-the-minute suggestions on timely trailers, complete in text and information on their use and cost. This service is free to all exhibitors and may be obtained upon request at any National Screen Service exchange. Prepared so that they may be inserted in a standard three-ring binder, monthly issues of Mister Showman may be retained to build a ready-reference file for special trailers.


For Your Convenience ← WHAT? (gain)
We Offer Free Parking ← (get or) WHAT?
In The Parking Lot ← WHERE?
South-east of the theatre ←
Every Day and Night ← WHEN?
From Noon to Midnight ←
Procure your Free Parking ticket at the Box Office when purchasing your admission ticket.
HOW?
We render this Added Service to enhance the Pleasure of your visit to this theatre.
WHY?

Here's an illustration of a likely trailer that demonstrates the use of all phases of trailer-writing explained in this article. Notice that it makes use of both WHY and HOW.

Rules of Procedure

For the purpose of acquainting managers with a simple method of preparing copy for special trailers, the following is offered, as rule-of-thumb, procedure:

First, you must take into consideration the fact that the trailer is going to reflect your individuality and the individuality of your theatre, and it is, therefore, desirable that it very obviously contains your thoughts and your own words.

Since a Special Trailer provides an intimacy with the patron, unobtainable in any other form of advertising, it is obvious that the simplest words, expressions, and explanations should be used in writing trailer copy. If your trailer is written so that the least intelligent of your patrons can assimilate its message, you can rest assured that those of more favored intellect will be sure to understand.

Now that you have decided your trailer is to reflect your personality, and shall be written in the same "Hi, Joe" style with which you address personal acquaintances, let us give some thought to what you want to tell your patrons. If your message is to be designed to sell something, we must first pay heed to the patron's desires in the matter, and the order in which you list the information or selling lines that will induce the patron to attend your theatre for the event advertised.

What?—That four-letter word is the key to your first thought. Is your trailer to sell the patron the entertainment, fun, glamour, and so forth, of a stage show? Is it to sell the patron the gain in a give-away? Does your celluloid Ambassador of good will intend to sell your patrons the comfort of some service you render? What your patron gains, and out of what he receives it, must be briefly and concisely contained in the first part of your trailer message.

Where?—As a point of information, as well as a necessary tie-up with the event, you must next inform the patron where it can be obtained. In direct relationship to their interest to the reader, the answers to the preceding two questions tell the story that sells the patron! They must come first, in the order shown, and they must get prominence.

When? — Having ascertained what they are to receive and where they can obtain it. The next thing your patrons will want to know is when the event will take place. I feel it is appropriate to advise you at this time that, to use the date before explaining what they will receive and where, is to lose it entirely. Until the patron's appetite has been whetted for the event, he has no interest in the date. Once, however, you have awakened an interest in the event, he will be eager to learn when he can see it.

Why? . . . or How?—Having covered the important phases of your message, you probably wish to clinch your sales effort with a sales-argument! Having told your patron that he will gain joy and entertainment through your stage show, you proceed to answer the question why by explaining that the cast successfully entertained patrons of Broadway's most pretentious theatres and clubs for a long-term engagement. You might wax even more enthusiastic and explain their unusual versatilities. If it is a picture you are selling, you might mention that the story is from a book that sold a million copies or explain the action you have undoubtedly referred to in the forepart of your trailer when you denoted the form of entertainment gain the patron would receive by elucidating with a brief account of thrilling scenes from the picture.

If the trailer were of a give-away, instead of answering the question why, you would answer to how, and explain the procedure involved in obtaining the set of dishes or the manner in which coupons are obtained for a turkey drawing and how and where the patrons will drop the stubs.

That tells the story, and should be followed by a very briefly condensed version of what, where, and when, because unlike newspaper or program or poster advertising, the trailer does not allow the reader to return to the beginning of the message to reacquaint himself with its content. That is why it is doubly important that your thoughts are presented in the order in which they will be most readily assimilated, and the important factors briefly repeated at the end of the message, if it is a long one.

SUMMATION

There is the trailer story—the story of a celluloid salesman, of a big job of pubilc relations, of a gigantic sampling campaign, of selling pictures, good-will, special events, of the establishment of the character of a theatre, and of the voice of the management, from the theatre's very heart, its screen!

It is the story of front-page advertising right in your own back yard and of a 100 per cent potential audience, eyes riveted to your screen, assimilating every message you flash!

No pages to be turned to find your advertising! No competitive advertising to mar its value! They can't throw it away! They cannot escape it! The grocer does not have it, nor does the haberdasher! It's the theatre's own advertising medium! Effective! Dominating! Eye-appealing!

If you have something to say, or something to sell, do it from your screen with trailers!

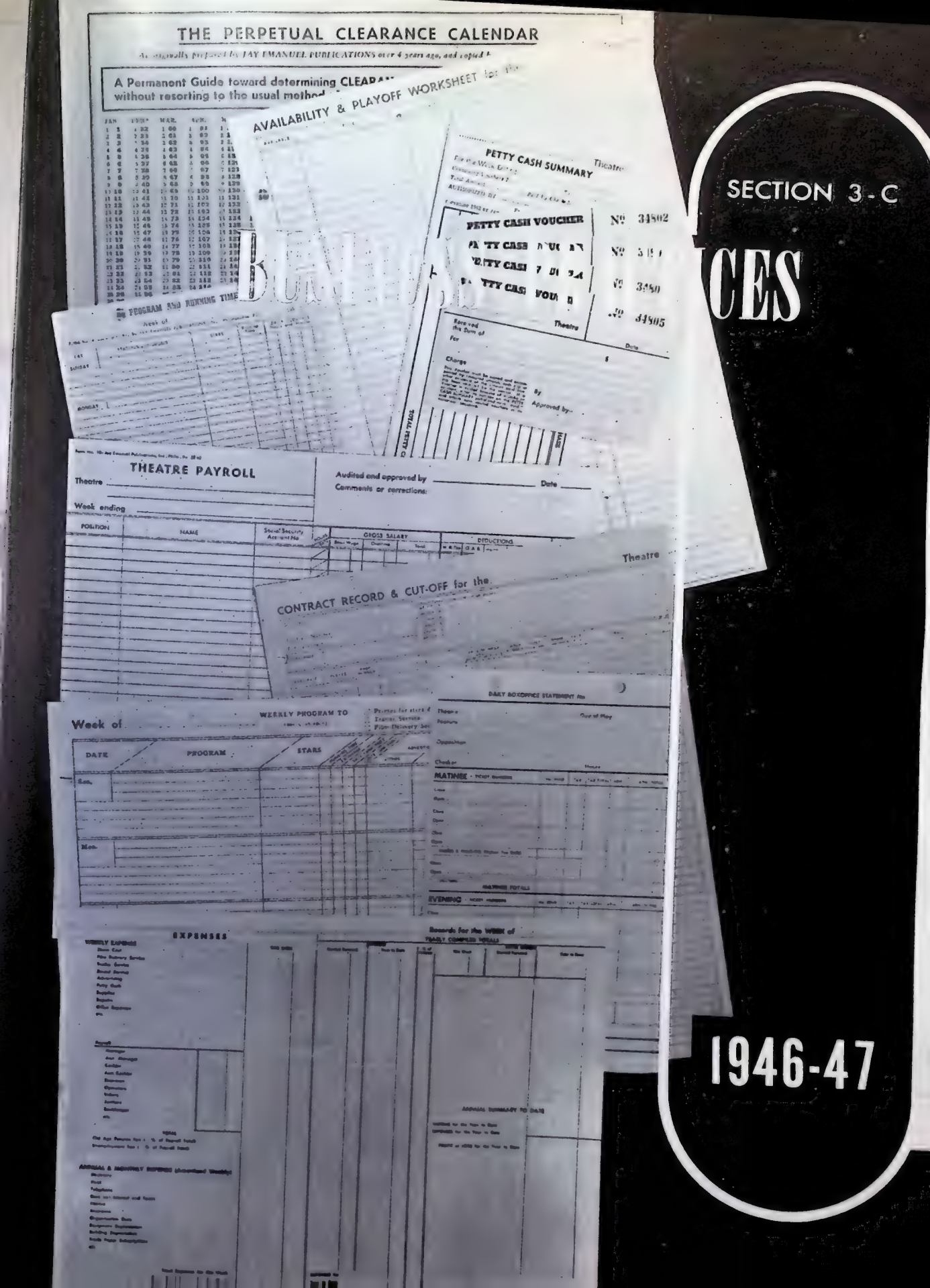
THREE ROADS to Profits

all Leading to your BOX OFFICE!

These are the THREE well-traveled roads to Profits ... that are being used by show-wise exhibitors, throughout the country ... to bring eye-and-ear-appeal to patrons ... at POINT-OF-CONTACT ... and bring them back ... again and again ... in a swelling stream ... that adds up to Bigger Grosses!

To sell that PICTURE! ... your POLICY! ... and your SERVICE! ... To get GOOD-WILL and MORE PATRONS! ... follow the road signs that read "TRAILERS" ... "ACCESSORIES" ... "SPECIAL TRAILERS" ... and watch The PRIZE BABY ... coming up these roads ... *followed by patrons* ... being led right to your Box Office!

NATIONAL Screen SERVICE
PRIZE BABY OF THE INDUSTRY



SECTION 3-C

ICES

1946-47

Notes on the Safe-Keeping of Theatre Cash

Major Problem of the Protection of Cash Solved Through Using Yegg-Stopping Safes

JOSEPH F. BRUSH
The Mosler Safe Company

Theatres, because of their accessibility, are one of the easiest of preys for the average cracksman and, for this reason, the protection of theatre cash has for many years been a major concern for theatre operators. Once the show is finished and the house closed for the night, the yegg, who has hidden himself temporarily, can come out in the open and proceed with his work unmolested. Usually the results are very worthwhile, the swag being in coin and small denomination bills quite difficult to trace.

Following the burglars' visit there remains many problems confronting the theatre owner in some cases. First, the contents of the safe, consisting of money, valuable papers, records, and the like, is gone or destroyed. Secondly, the safe itself has been ruined; and, thirdly, considerable damage to theatre property itself has been sustained. Owners are left with an insurance claim for all these losses, if fully covered, and in most cases must stand for some portion of the loss himself. The yegg does not even stop at this point but may even fatally injure an employe—yes, kill him if it becomes necessary.

Assuming this to be the end of the story is quite easy, but this does not follow. The Insurance Underwriter must satisfactorily adjust all of the above claims, provided they are liable under the terms of their policy, and these claims amount to many thousands of dollars each year. For this reason theatre risks are given a special classification in the Underwriter's Manual with rates considerably higher than other commercial enterprises. These rates vary in practically each state in the country.

About 25 years ago theatre losses assumed such serious proportions that the insurance companies requested the aid of the large safe manufacturers to devise a safe which would provide a greater degree of protection for them against burglarious attack. The Mosler Safe Company, Hamilton, Ohio, was one of the first to extend the helping hand and offered the services of its engineers, who were dedicated to "stop the burglar." Out of this effort came the present day round door burglary-resistive money chest which has defeated the "cracksman" from that time to the present.

The round door money chest is a steel box constructed of 1-inch solid steel body and having a 1½-inch solid steel door. The steel is usually specially treated by a "case-hardening process," resulting in a tough, extra hard, drill-resistive surface.

Circular doors of the chests are usually heavy lug-type interlocking with similar lugs on the chest body and operating not unlike the breech of a gun. Special "punch-proof," bank-vault-type combination locks, provided with Underwriter's Laboratories approved re-locking devices, comprise the locking mechanism.

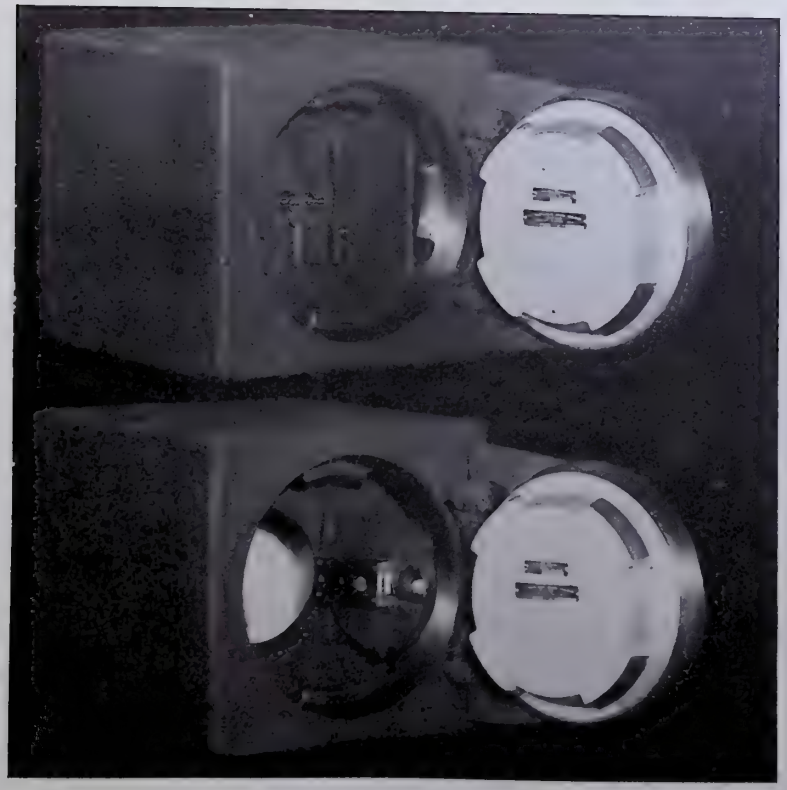
In order to obtain protection against holdup, an inner steel door or hold-up partition can be provided within the chest. This is equipped with a round door on which is installed a safe-deposit-type dual control, two-key lock. Above the door is a slot wide enough to accept bills. The operation of this feature is quite simple. All monies not required for immediate use are dropped through the slot and cannot be extracted except through the inner door. This door requires the use of both keys in order to open, one key being insufficient.

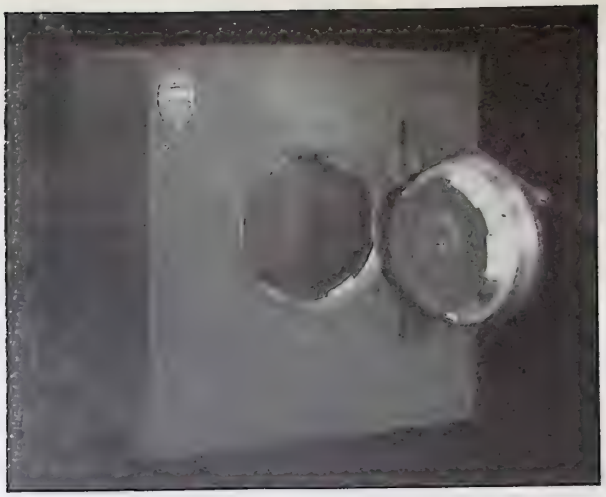
Chests of this description are used extensively in theatre work today in two ways. Should the theatre require a secure place for books and records, a small fire-resistive type of safe, with a burglary-resistive money chest anchored in the bottom, is used. If the protection of cash is the only desire then the burglary chest is furnished complete, by the safe manufacturer, embedded in a steel cladded, reinforced concrete block. This concrete block and chest has no wheels and comes in weights varying from 800 to 1,600 pounds. The heavier the unit the greater the security.

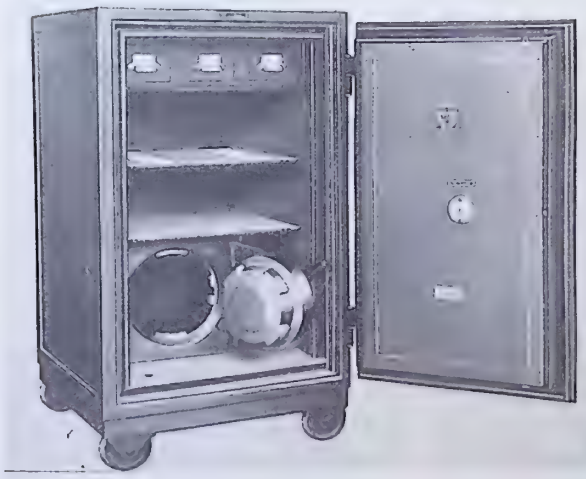
With safe equipment of this type installed in a theatre two major benefits are immediately obtained. The first, and most important, is the elimination of loss by burglary and, second, a reduced insurance premium. The latter usually is sufficient to return the entire cost of the safe over a short period of time.

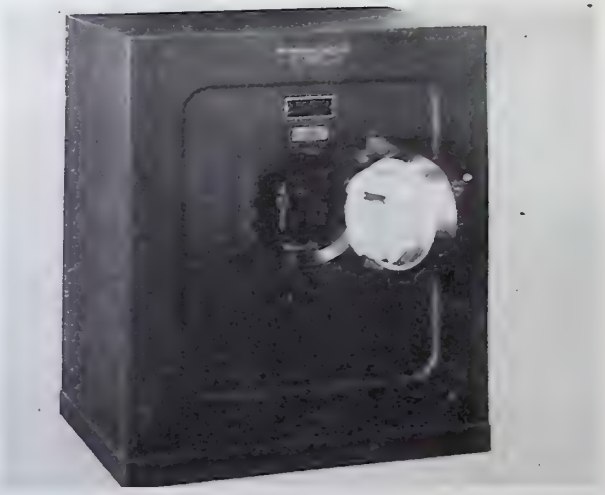
The solution of this problem is a very simple one. Merely install a round door burglary-resistive chest, in a fire-resistive safe or preferably a steel-cladded, reinforced concrete block, and your worries on this score are ended. Better your safe protection and you will "halt the safe-cracker"—perhaps before he starts.

CHESTS for the protection of theatre cash are most important. Shown here is a chest with a bank-type combination lock, with the added protection of an inner door requiring two separate keys to be opened. This type of chest can be used as it is, placed in other safes or vaults, or encased in a steel-reinforced concrete block. Chests like these are rated by the Underwriters' Laboratories and the Safe Manufacturers National Association.

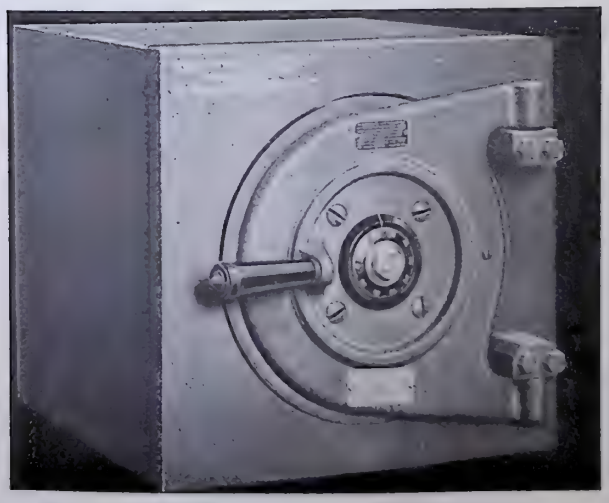


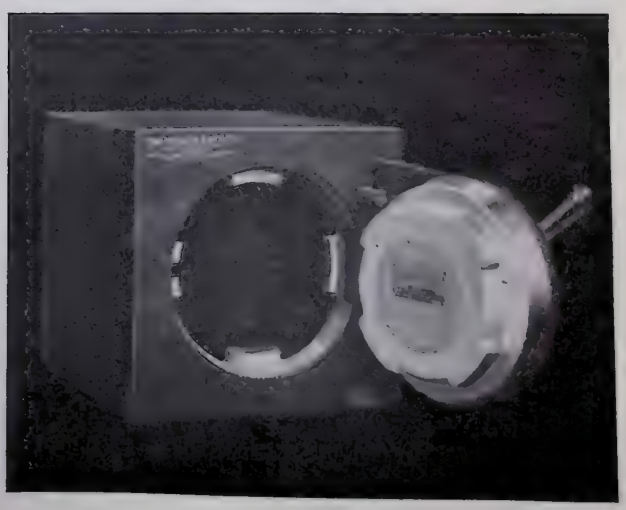






TYPES OF BURGLARY-RESISTIVE CHESTS, and ways in which they can be used are shown in these pictures. The two pictures at the top show a chest as it appears after being encased in a concrete block for further protection. This model does not have the two-key inner door. At left center is a chest set in a regular safe, where adequate protection can be given valuable papers and records and double protection to cash. At right center is an encased chest of the type with an inner door which requires two keys for opening. The two pictures at the bottom of the page show chests similar to those of the top two pictures, but not encased in concrete.





The Boxoffice Safe for Foiling Holdups

Two-Key Depository for Change and Bills Protects the Cash in Event of Surprises

In the flow of cash, from the point of sale where it leaves the possession of the patron and becomes the property of of the theatre, to its eventual placement in the night depository of a neighboring bank or in the theatre's own burglar-proof safe, care must always be given for its safety from holdup and burglary. In this flow, the age-old maxim that "a chain is as strong as its weakest link" could well be applied.

Following the flow of cash, we find that there are two dams where it accumulates in sufficient quantities to excite the interest of the professional thief. The largest of these dams will always be the manager's office and theatre safe where an entire day's receipts are concentrated. This subject has been treated elsewhere. Our primary concern in this article deals with the other, or box-office, dam where an entire show's receipts are concentrated.

The major differences between these two concentrations is the time element necessary to a successful theft, and the accessibility of quick escape. A holdup of the manager's office, made possible by lack of care in locking doors or failure to use proper precautions in admitting someone, would still require the thief's escape through the theatre and past many members of the theatre staff. As a result, the usual method of theft is to hide inside until after the theatre is locked for the night or to break in at that time and attempt to rifle the safe with fair certainty of not being disturbed for a number of hours. On the other hand, a holdup of the box office is a flash affair, sprung at the moment deemed best by the highwayman who can lurk in a doorway or across the street, helped by the shock and surprise of the cashier, and with escape on the run or in a waiting automobile a relatively simple and unnoticed procedure.

The location of the box office, usually an island at the sidewalk line and removed from other members of the house staff, is another point that makes it vulnerable to holdup. It is to furnish an impediment to this flash and speed that the box office safe has been designed. Normally anchored to a joist or other sturdy portion of the box office, with its screw heads countersunk in the safe's interior so that a crowbar and the virtual destruction of the box office would be necessary to remove it. It furnishes a quick and safe depository for all bills and rolls of coins more than the normal requirements for making change.

THE BOX-OFFICE SAFE has been designed to furnish an impediment to the flash and speed of the usual cashier hold-up. The safe is normally anchored to a joist or other sturdy portion of the box office, with screwheads countersunk in the safe's interior. A special rabbet-edged door—which needs two keys to open it—is provided. The model shown here has a currency slot and also an additional channel for the deposit of spare rolls of coins.

The Ballam box-office safe is constructed of ¼-inch machine steel welded into a 12½ by 7½ by 5-inch box, weighing 29 pounds. Its interior capacity is 335 cubic inches. A special rabbet-edged door is equipped with a steel reinforced lock requiring two inter-relating keys in order to open it. One model is equipped with a currency slot protected against fishing out money by an interior saw-toothed baffle plate. Another has both this slot and an additional channel for the depositing of rolls of coins up to half dollars.

In either one, the actual use procedure is the same. Constantly through the box office day, accumulated cash or rolls of coins are pushed through the slots, leaving only a normal supply of change in the change-making machine and cash drawer. One of the two necessary keys is retained by the manager in his office, while the other can be kept by the cashier or doorman, thereby necessitating the presence of both in order to open the safe. The absence of the second key makes it physically impossible for the cashier to hand over cash regardless of her fright or surprise. The position and anchoring of the safe itself would make it a lengthy and noisy job to remove in its entirety. Therefore, the cash is safe.

It has been reasoned that the inaccessibility of the holdup cash under this method may cause a thief to shoot at the cashier or in other ways do serious damage; but the very nature of such crimes depending on speed and escape seem to indicate that the thief will not do anything to attract undue attention and at most will take what little cash he can reach and hurry off. The fact remains, that if all theatres were equipped with such depositories in the box office and this was made generally known, this type of holdup would cease.

Suggested Safeguards in Case of Holdups

Bandits Will Pay Cinemas More Attention When Grosses Start Hitting New Highs

When box-office receipts start to swell to overflowing in many of the large metropolitan sectors and grosses surpass even the most optimistic predicitions of the industry, one natural result has been an increase in theatre robberies in all parts of the couuntry.

Bandits, attracted by lines at theatres, and probably hearing of many peak grosses of 1946, really increased their activities to such a point that many exhibitors are taking special precautions to prevent the spread of this wave of lawlessness. To bring to the attention of its readers some of the safeguards used by many theatres to offset some of the increased criminal activities, the cooperation of Loew's theatres was sought—and secured—and Loew employes assisted in the posed photographs which appear with this picture article.

Included in the photographic coverage are precautions now being taken by theatres of the Loew circuit.

THIS COULD HAPPEN to any theatre cashier. A robber, posing as an eager patron, passes to the cashier a note demanding all of the cash. With, in a great many theatres, a relatively large amount of ready cash in the box office, theatres are one of the favorite objectives of the preying gentry. More cash, more danger.

THE CASHIER, however, remains cool and calm. She knows exactly what to do in emergencies of this type (even though she does not like it, either). Beneath her hand is a button which sounds a tell-tale signal in the manager's office. The button is installed so that it can be instantly operated without the robber's knowledge.

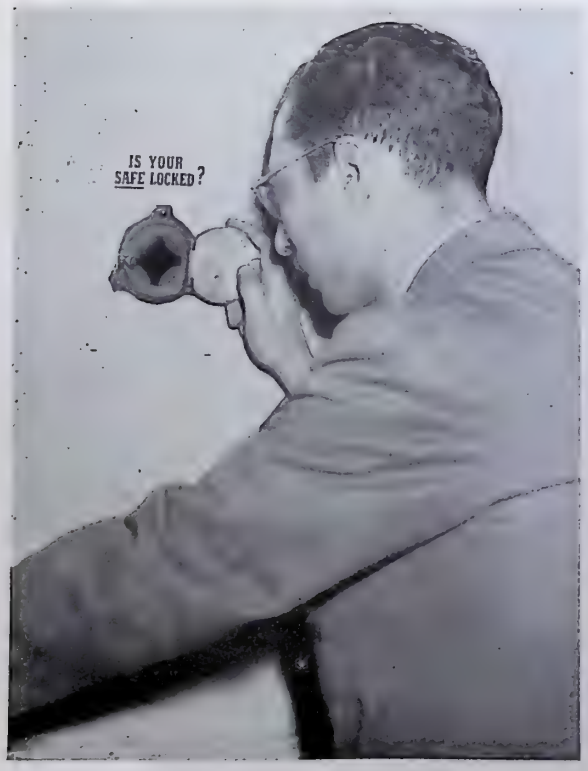
THE MANAGER, in his office, recognizing the clarion call of that summons, springs into action and dials the number of his precinct's police station. In the event of emergencies like this, the number is constantly kept posted in an easily observed spot, for valuable time cannot be lost while the number is looked for in the telephone directory or through dialing the wrong number as a result of a tricky memory.

While a box-office holdup is frequently a lightning-fast occurrence, the police may not, like the U. S. Cavalry, arrive in the nick of time, but they can always be of assistance when summoned at such times.

IN THESE NEXT TWO PAGES are found a photographic survey of some of the measures that may be taken to prevenf burglaries. Here is shown how money should be passed—below the level of the deal plate—when it becomes desirable to take some of the bills to the safe in the office. No outsider should be witness.

ALL EMPLOYES empowered to transfer money from the box office to the office should be most careful to place it in the pocket without being seen by patrons or passers-by. As he collects the money, the box office is, of course, locked, and the cashier keeps right on selling. Transferrance of the money is made immediately.

BACK IN HIS OFFICE, the manager takes care not to open the door to anyone. A peephole affair is used for more protection, so that the prospective caller can be seen and identified. The sign, "Is Your Safe Locked?," is an important reminder to anyone in the office and summoned by a knock, expected or not, on the door.



WHEN A THEATRE AIDE knocks on the door, the manager sees who it is. In this case an usherette hands him an article found in her station. Special signal raps should be used for the convenience of all—but the signal should be changed frequently so that no outsider can become familiar with it: just another precaution.

JUST TO MAKE CERTAIN that no bandit has tampered with the special buzzer system—or that anything else has happened to put it out of order—the house electrician regularly inspects the wiring. When the manager is out of his office, the buzzer can be heard by the night guard. Maintenance here, as everywhere, pays off.

ANOTHER SIGN—"Is Your Door Locked?"—affixed to the safe is another reminder to act with caution. If the manager is not sure of the answer to that question, he should make certain before starting to open the safe. This type of constant reminder is very valuable, it keeps driving home the need for alertness on everybody's part.

MANY A HOLDUP has taken place when the manager or his especially assigned aide takes the daily receipts to the bank at the end of the last show. The best way to prevent such happenings is to call the precinct station and have an officer come over and escort the money-bearer to the bank. This is generally a police service.

IN THE PRESENCE of the policeman, the money is placed in the bank's night repository, and the theatre day is over. In the protection of the theatre cash—no less than in the protection of all items of the physical theatre—never take anything for granted, and always take complete advantage of all possible sources of protection.

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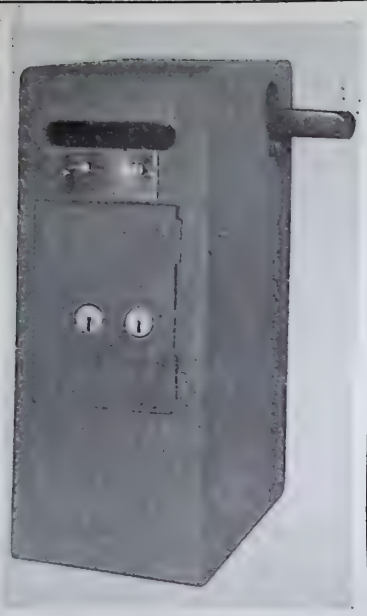

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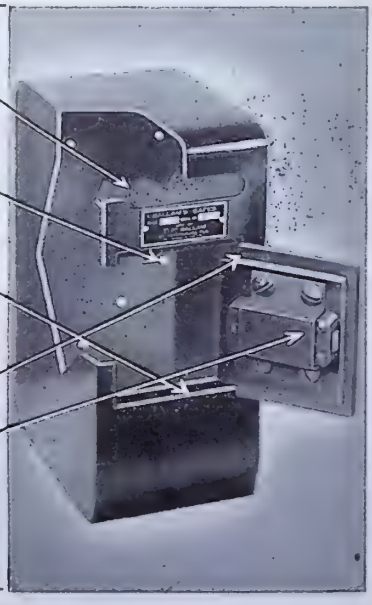
B. Five holes through ¼" machine steel, accommodates round headed wood screws, situated in back at random widths to accommodate any location.

C. Rabbet-edge frame permits counter sunk door thereby preventing the use of a pry bar to open.

D. Interlocking flange of door slides behind frame when closing and, together with lock presents a securely locked door even if hinges are removed.

E. Heavy band of steel prevents lock from being punched thru.

If booth wall is frail, reinforce by fastening a board, same size as back of safe, to studding with screws, then anchor safe to board. Put safe in most convenient place for cashier to deposit the surplus money as fast as taken in, leaving just enough for change.



SPECIFICATIONS: **BODY**—Body of Safe, ¼ inch machine steel welded thruout. Outside dimensions: 12½" high, 5" wide, 7½" deep. Inside dimensions: 12" high, 4¼" wide, 7" deep. Capacity: 335 cubic inches. **DOOR**—Door and front of Safe, ½ inch machine steel welded throughout. Top, front and bottom of the door fits in rabbeted body of Safe. Rear of door interlocks ⅜ of an inch from top to bottom with body of Safe, making it just as securely locked with the hinges removed as it is with them on. In fact, the hinges are put on so they can easily be unscrewed, preventing them from being forced off by gangsters, and damaging the Safe. Their only purpose is to swing the door open and shut. **LOCK**—Lock is a high-grade double-nose lock, requiring two different keys to open. A heavy band of steel, closely fitted, completely covering the lock, is securely bolted to the ½ inch door, preventing the lock from being punched through if attacked, is standard equipment. **CURRENCY CAPACITY**—Money slot, at the top front of Safe, 3½" x ⅝", will take fifty one-dollar bills at one time. It is protected with saw tooth baffle plate to prevent fishing money out of the Safe.

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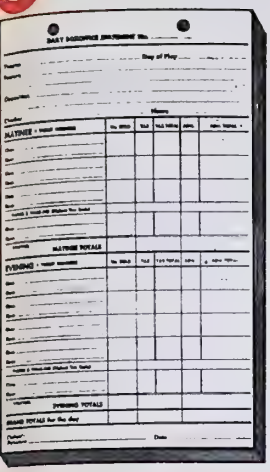

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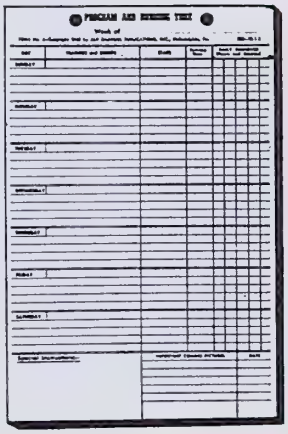

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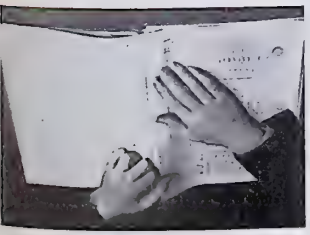

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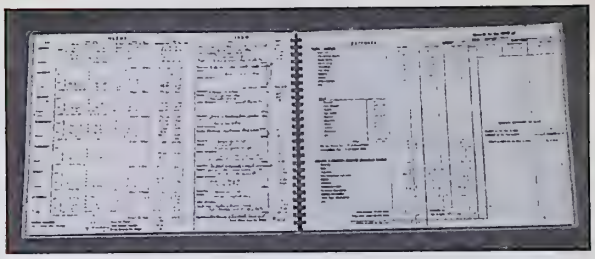

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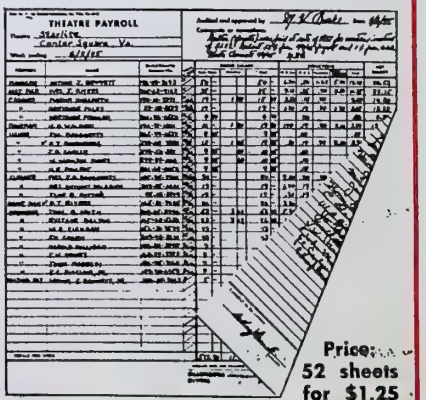

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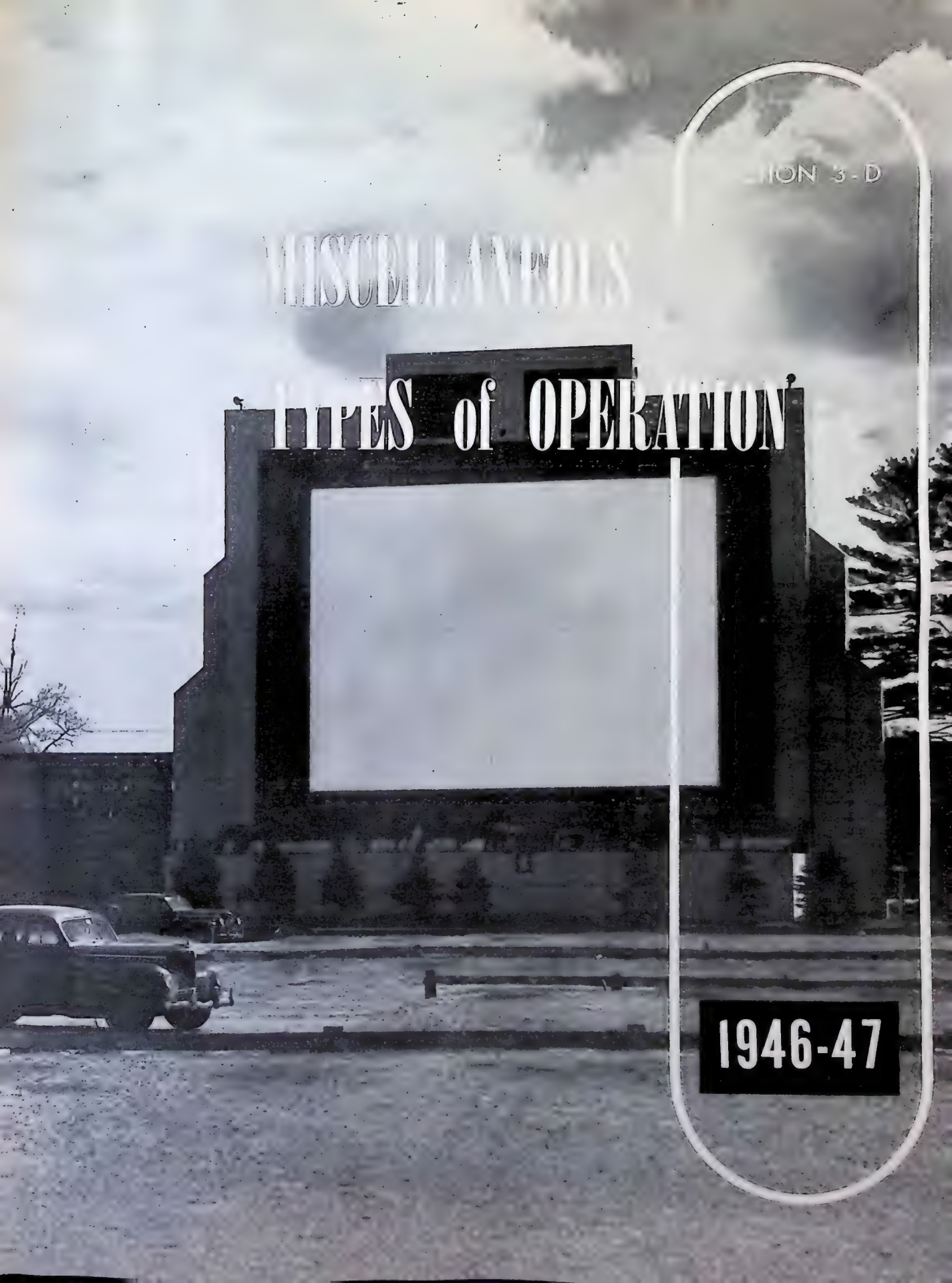
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MISCELLANEOUS
TYPES of OPERATION
1946-47

Notes on Management of Drive-In Theatres

Ten Years' Experience Yields Suggestions In Operation of the Auto Drive-In Cinema

By Carl Hellpen
E. M. Loew's Theatres

The automobile drive-in theatre is definitely here to stay. It claims no superiority over the indoor theatre, but as I just said, it is here to stay, despite the expressed opinions of some operators of the other type of theatre, due primarily to its practical side. It has proven a solution to the entertainment problem of many thousands of auto owning families who do not regularly go to the theatre or see pictures indoors, due to physical handicaps or family circumstances.

Much has been said as to advantages of the drive-in, both pro and con, but little about the business side from the standpoint of management or operation. The industry is comparatively young but the experience of management is not too great. The drive-in theatre patron today is of quite a different class than when these theatres were first conceived. They have turned into a source of entertainment for the whole family and chauffeur-driven cars are not today an oddity in this type of theatre.

The out-door theatre must be placed in the hands of those who enjoy working out of doors, persons who are not averse to weather conditions that may present themselves during the season. Weather conditions, from my personal experience, are not a handicap. I have found that unless temperatures are too severe or storms exceedingly heavy it makes little difference to business. The development of the latest equipment, such as the in-car speaker, allows patrons to close their car windows, sit in comfort and enjoy the full program.

The drive-in theatre is basically the same as any other large out-door attraction. They must be kept attractive and pleasing to the eye with normal comforts the same as are expected in any indoor theatre, clean and attractive rest and powder rooms. Service, while it is under the stars, must be courteous and attentive and the welfare of the patron given first thought at all times. All attendants should have a pleasing personality and be nicely uniformed for their positions.

In maintaining conveniences all operators of drive-ins should not overlook the concession stand. It is a profitable asset and should be located in such a way to be of service to the greatest number of patrons with the least inconvenience. The use of car venders should not be considered if one wishes to increase the popularity of the theatre. Privacy is one of today's selling points of this type of theatre and nothing should detract from it to mar the enjoyment of the program being offered.

There is quite a contrast in the maintenance of a drive-in and an indoor theatre. Managers of drive-ins should be those who have knowledge of outdoor maintenance and exploitation. While they do not have to think about keeping carpets clean, they do have to give thought to seeing that the grass is kept cut, hedges trimmed, and seasonable flower beds maintained, as well as other outdoor accessories. The whole plant should be kept in a manner so attractive that a passing motorist will want to come in.

The frequent painting of all structural parts of the plant is most important. Not only does this make for a cleanly appearance but it is by far the best protection of the property. The entrance to the grounds, as well as the exit, should be well kept. Consideration should be given for a good lighting scheme for the attraction of patrons, bearing foremost in mind that this illumination should not reflect into the theatre where naturally it must be kept dark as possible. Where the bumper type ramp is used there should be protective white paint used for the guidance and protection of the drivers.

The drive-in theatre preferably situated on a main thoroughfare should be located so that the screen is not visible from the highway. Otherwise it is liable to create the hazard of roadside parking. One way to prevent this is the use of tall shrubbery, such as cedars, privet, and other greens along the theatre property boundaries. These are far more attractive, if well kept and cared for, than unsightly high board fences.

My experience has been that the drive-in theatre can be properly policed and patrons can be given every protection very easily. This is accomplished by a periodical policing of the ramps by a uniformed usher, trained to quietly and diplomatically correct any of the exploited abuses that have been publicized to the detriment of the modern drive-in theatre. Incidentally I may say the times when it is necessary to speak to occupants of cars are few and far between.

SCREEN MAINTENANCE is highly important for drive-in theatres. Being open to the elements, it may be necessary once a year, and perhaps oftener, to give it a new surface, as is being done in this picture.

While the indoor theatre can display to the public by means of marquee and lobby displays of future programs, thought should be given in the out-of-door theatre to see that proper advertising is used to catch the eye of the fast-moving motorist. Much care should be taken to see that display boards are kept in a way that they do not become an eyesore or distract in any way from the natural beauty of the theatre property or general surroundings. Needless to say, driveways and walks should be kept clear and clean and properly marked for the guidance of patrons.

One source of great interest is what to do with the drive-in theatre property and equipment during the winter months. There are many ways the property can be utilized provided some thought is given to it at the time of the construction of the theatre. Should it be located in a community lacking in outdoor winter sports facilities there are numerous possible uses. With some forethought an ice skating rink can be easily installed and the theatre ramps make most convenient parking spaces. If there is sufficient area to the property, space could be allotted to a bowling alley building. Then there is the possibility of installing a convenient indoor neighborhood theatre in which the drive-in projection equipment, with a slight change over, could be utilized. These suggestions naturally apply to drive-ins located in northern climes where for climatic reasons the out-of-door theatre must be closed for five months or more. They show, however, the possibility of making the theatre property a year round operation.

The newly constructed drive-in should not be without a gas station and service for at least minor auto repairs. These are of year-'round value to the community and profitable to the theatre owner as well. If the theatre is on a main or good secondary highway, diner or restaurant service can be offered to the theatre patron and general public, making for another source of revenue.

If the drive-in is so constructed, it is less seasonable in operation. At the end of the season all equipment and inventory should be removed to a warehouse for safe keeping and made ready for re-installation with the return of good weather. The cost of this warehouse storage is economical and affords much greater protection for equipment from climatic conditions than keeping it on the theatre site under the eye of a watchman.

Cinemas That Go Down to the Sea in Ships

Short Summary of Motion-Picture Theatres Provided by the Modern Queens of the Sea

With the shooting war over and the seas freed from submarines, mines, and other agencies of international conflict, and the lanes of the Seven Seas again opened to the peaceful pursuits of commerce, the mighty queens of transport are returning to claim their rightful domains.

As one ponders these mighty leviathans of international commerce and pleasure travel, more like mobile cities they seem, rather than like the "rolling hotels" that ply between a nation's coasts. And as cities vary in character, type of population, and conveniences and services offered, so do these ocean liners. Even in the facilities provided for the enjoyment of motion pictures do they parallel their land-bound kin.

All theatres can, as did Caesar with ancient Gaul, be divided into three parts: (1) permanently erected theatres, designed, built, and equipped for the sole purpose of merchandizing entertainment; (2) halls, so designed and equipped as to be used for exhibition purposes, while being available at other times for other uses; and (3) spaces where pictures can be shown, but with the equipment more or less temporarily installed.

So it is with ocean liners, for in the ships of the various sizes are to be found motion-picture facilities of these three types, and, as typical of the cinemas, there are shown on these pages the theatre space provided on the SS. America of the United States Lines Company, the SS. Queen Elizabeth of the Cunard White Star, Ltd., and the SS. Santa Margarita of the Grace Line, Inc.

Before going on to a brief consideration of these sea-going theatres, it might be well to note that such cinemas are just other theatres to American distributors. Most film companies supply their current releases to steamship lines for showing to passengers en route. Occasionally a pre-release showing is granted to some particular ship, but this is neither a frequent nor a general practice. The rental is, of course, on a flat-fee basis. The amount of that fee depends on the size of the ship, the length of time the print is held, and, sometimes, the age of the release—that is, if it has just been placed in distribution or is in subsequent runs. Each film company works out its own details with the lines.

ABOARD THE SS. AMERICA there is no formal theatre, motion pictures on this United States Lines Company ship being shown in the lounge of each class. Here is seen the main lounge of the American sea queen which did valiant service in the war as a troopship under the Navy-given name of USS. West Point. In the cabin- and tourist-class accommodation, facilities—hardly less luxurious—and no less comfortable—are used from time to time for the exhibition of motion pictures. The SS. America has spacious accommodations for 1,053 passengers; 520 first-class and 344 cabin-class passengers, and the balance of 189 as tourist-class passengers.

THE SS. QUEEN ELIZABETH, flagship of the Cunard White Star's trans-Atlantic service, on October 21 completed her maiden passenger voyage from Southampton to New York. Aboard this queen of the seas are two theatres numbered among the 35 public rooms which serve the 2,314 passengers. The Queen Elizabeth, however, is a veteran of unnumbered crossings, having served throughout the war as a troopship of His Majesty's Navy.

THE SS. AMERICA

On October 17, 1946, the 26,454-ton luxury liner, the SS. America, steamed out of New York harbor, to resume a commercial career which, like that of many a United States citizen, had been interrupted by a call to arms.

The United States Lines' ship was commissioned in June, 1940, and after a few crossings, was, early in the war, drafted by the Navy, renamed USS. West Point, and used as troopship.

In the reconversion to civilian life, considerable basic rebuilding had to be done, especially in the cabin portions of the ship. In the public rooms, the Maritime Commission endeavored to place everything back as it was—and where this could not be done, as was the case in some of the decoration, the new ideas sometimes proved more acceptable than the original ones.

The America proudly enters the north Atlantic service, with regular scheduled sailings to and from Cobh (Queenstown), Southampton, and Le Havre.

The America carries 1,053 passengers, 520 in its first-class accommodations, 344 in the cabin class, and 189 in the tourist class. While a three-class ship, the American builders have given effective demonstration of the belief that passengers in the tourist class should not be penalized with shoddy cabin fixtures and stained companionways simply because they cannot afford private suites. Public facilities, companionways, and cabins are comfortable and in many respects even as decorative as the more expensive accommodations. Accordingly, the different classes cannot always be identified at first sight.

Simplicity, impressive simplicity, is exemplified through the SS. America. Throughout the public rooms and in most of the cabins the emphasis is on bleached woods, bright decorations, veneered and lacquered finishes, and clear colors of red and green.

There are 23 public places aboard the America, including a tiled swimming pool, a ballroom in tones of soft rich red with curtains of hand-woven silk oyster white, a main lounge with mezzanine galleries, smoking rooms, and cocktail lounges.

There are no theatres, in the usual sense, aboard the America, but the

SITUATED ON THE PORT SIDE of the B Deck of the SS. Queen Elizabeth is the Tourist-Class Cinema, decorated with painted walls which are relieved by straight-grained walnut veneer and fabric paneling. The stage and screen are at the forward end of the room, the walls of the stage being painted a soft olive green. Deep settees are built to the side bays and illuminated by concealed lights. Comfortable chairs of tubular steel, which can be easily stacked when it is desired to use the theatre for other purposes, provide seating arrangements for 129 passengers. This is the subsequent-run in the Cunard Line's floating community.

THE QUEEN ELIZABETH'S FIRST-CLASS CINEMA is situated aft of the Smoking Room and Garden Lounges. With a seating capacity of 380, it is especially designed for good acoustics. The color scheme combines blue carpeting, chairs uphostered in vermillion, and walls finished in ivory. The theatre can be approached from the after end by cabin-class passengers, who are allotted special hours for its use. There is a small stage which is used for ship's concerts and the like. Small lighthouse lenses, arranged as decorative spots in the enclosing walls, supply lighting. This is, indeed, a Radio City Music Hall of the floating city of 2,314 population.

lounges of each class are equipped for the showing of motion pictures when desired. In these pages is shown a picture of the America's main lounge, typical of the facilities available aboard the United States' reigning Queen of the Seas.

THE SS. QUEEN ELIZABETH

Reborn after a period of drab but dramatic service in the war, the 85,000-ton luxury liner Queen Elizabeth also last fall accomplished her maiden crossing. Like her American cousin, Atlantic crossings are nothing new for the majestic liner.

Many readers will thrillingly recall how, even before she was completed, the Queen Elizabeth made a dramatic dash across the Atlantic in the early days of the war, here to be converted into a troopship of His Majesty's Navy.

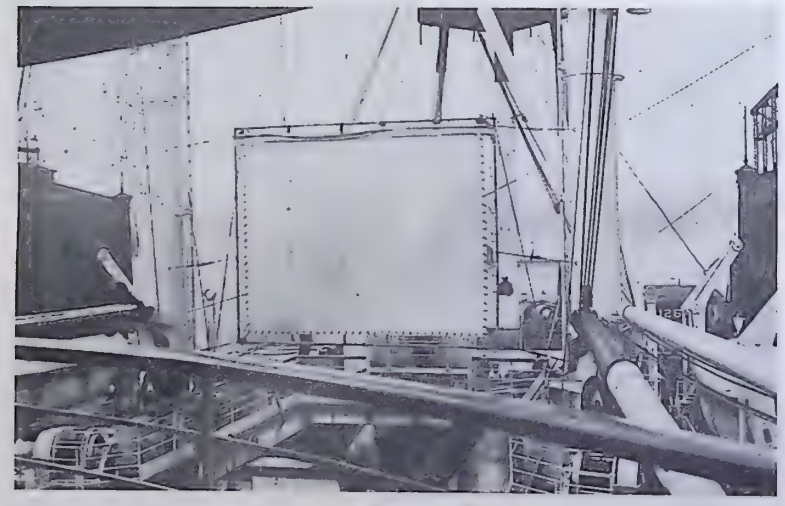
Tricked out in regal raiment—much of which was the original material that had for years been stored—and having made her long-deferred maiden voyage, the Queen Elizabeth has accommodations for 2,314 passengers, with 820 in the first-class space, 720 in the cabin-class, and 744 in the tourist class. (As a space sidelight, it might be said that the Queen Elizabeth has carried as many as 20,000 troops on a single trip!)

The Queen Elizabeth's passengers are able to luxuriate in 35 public rooms, and as many elevators will speed them through the ship's deep interior. The Cunard White Star designers have tried to think of everything to make life aboard this ship comfortable, with special attention being paid to tourist-class comforts, including an enclosed promenade deck, a sports deck, with a sheltered observation bar for spectators, and two theatres.

The Queen Elizabeth first-class cinema is situated aft of the smoking-room and garden lounges. With a seating capacity of 380, the theatre is especially designed for good acoustics. The color scheme combines blue carpeting, chairs upholstered in vermillion and walls finished in ivory. This theatre can be approached from the after end by cabin passengers, who are allotted special hours for its use. There is also a small stage which is used for ship's concerts and the like. Small lighthouse lenses, arranged as decorative spots in the enclosing walls, supply the lighting for the room. The auditorium is air-conditioned.

LOOKING TOWARD THE REAR of the First-Class Cinema on the Queen Elizabeth, there is noted an unusual arrangement of seats—unusual, perhaps, only because the architectural demands of theatre construction aboard a ship is not wholly comparable to those of cinema building on some city lot. Yet the theatre bespeaks comfort. Fully upholstered chairs, carpeted floor, modern equipment, and air conditioning make this a commendable cinema.

ABOARD THE SANTA MARGARITA, one of the new "Santa" ships being placed in the Caribbean and South American service by the Grace Line, motion pictures will be shown to passengers and crew. Because of the nature of these passenger-cargo ships, the cinema facilities take on the aspect of under-the-stars informality. The booth is installed on the top deck, directly aft of the funnel (top). Theatre-type, 35-mm. equipment is used.



THE SCREEN is installed between two Sampson posts alongside the swimming pool, between the No. 4 and No. 5 hatches, and raised about 10 feet above the deck (middle). Speakers are attached to the Sampson posts. The performance is seen by crew members from the swimming-pool deck and the 52 passengers may view it from either the veranda cafe (bottom) or the sundeck with equal ease. The programs consist of a feature and a short subject.

Situated on the port side of the B Deck of the Queen Elizabeth is the tourist-class cinema, decorated with painted walls which are relieved by straight-grained walnut veneer and fabric paneling. The stage and screen are at the forward end of the room. The walls of the stage are painted a soft olive green. Deep settees are built into the side bays and illuminated by concealed lights. Comfortable chairs of tubular steel which can be easily stacked (leaving the room clear for other uses), provide seating arrangements for 129 passengers.

THE SS. SANTA MARGARITA

While the showing of motion pictures in the larger trans-Atlantic liners is not a recent development, exhibition on smaller ships—smaller in tonnage as well as in passenger capacity—has not been too far advanced.

But the idea is growing, and early last year, as the Grace Lines' ships were beginning to re-enter the Caribbean and South America services, this company decided to provide what motion-picture entertainment as might be arranged.

Thus, complete motion-picture projection and sound equipment—including special loudspeakers and screens for outdoor use—were installed on nine Grace Line ships, such as the Santa Margarita pictured here, to make possible movies under the stars.

The film programs are viewed by the passengers—these ships provide space for only an intimate group of 52—from a semi-sheltered veranda cafe. The installations represent an idea borrowed from the wartime logs of troopships, battleships, and flattops for whose crews the showing of motion pictures on deck was a major form of entertainment.

Many special requirements are imposed on the equipment for these seagoing theatres, and the Radio Corporation of America line of equipment was selected as satisfying the specifications. Standard projectors and sound systems are used. The only special equipment required, aside from an outdoor system, is the rugged collapsible screen, which was specially designed.

The pictures are projected aft and are shown on a portable 15 x 15-foot screen which is fitted between the Sampson posts alongside the swimming pool between No. 4 and No. 5 hatches, and raised about 10 feet above the deck. The speakers are fastened to the Sampson posts and directed so as to afford the best possible reception.

The performance is seen by the members of the crew from the swimming-pool deck, while the passengers view the show from either the veranda cafe or the sun deck with equal ease.

Each vessel is equipped with two 35-mm. projectors of the latest type. They are housed on the top deck, directly aft of the funnel. The booths are permanent installations, and are fully equipped with storage, splicing devices, rewinding machines, and other items of equipment usually found in booths.

a short subject. Although current re-

Performances consist of a feature and

releases are being used, the company expects pre-release material will be shown when all these nine combination passenger-cargo ships are in service.

Seats Without Waiting, at $52 a Year Up!

Annual Subscription Plan Is Inaugurated For the Park Avenue Theatre in New York

Waiting in line has long been the No. 1 objection to America's movie-going public.

At a cost of over $1,000,000, Walter Reade, head of Walter Reade Theatres, tackled the great problem, and remodeled the former Anderson Art Galleries at 59th Street and Park Avenue, in the City of New York.

The theatre, the first one ever to be erected on this Main Stem of the metropolis's high society, offers New Yorkers a cinema resembling and having the comforts of their own living rooms, showing pictures of acclaimed merit—and providing "Seats without waiting" sold on a subscription basis one year in advance.

THE SUBSCRIPTION PLAN

This advance sale is done in the following manner: Every patron fills out an order form on which he specifies how many seats he wants, on what nights he wants them, and whether he wishes to attend the 7 or the 9 o'clock show. The cost is basically a dollar a week up for each performance, or $52 plus tax for the 7 o'clock performance, and $78 plus tax for the 9 o'clock showing. As there are two different bills each week, one starting Sunday and the other Wednesday, a subscriber may wish to come twice a week. This order form is then sent into the theatre, where it is recorded.

Other subscription rates, with the taxes then in operation added, according to the original announcement, were as follows (the figure in parenthesis being the amount of the taxes):

Monday through Friday, at 7 p. m. (any two performances) ...$124.80 ($20.80)

Monday through Friday, at 9 p. m. (any two performances) $187.20 ($31.20)

Saturday evening at 7 or 9 p. m., and Sunday, all performances (any two of these performances and a 9 p. m. performance during the week).....$187.20 ($31.20)

Any performance on Saturday evening or Sunday, and a 7 p. m. performance during the week $156.00 ($26.00)

Instead of a ticket each patron receives a plastic identification card with his name and seat number engraved upon it. This he flashes at the door and is immediately led to his seat. The seats will have on their arm the names of those who reserve them. This system eliminates entirely standing in line at the box office or waiting for seats in the lobby.

A subscription office was opened in the building last Labor Day. Since the first day's operation and with construction going on about them, the men in this office were busy answering over five hundred mail, phone, and personal inquiries each day. And by the beginning of October it was announced that subscription sales were 62 per cent of the goal that was hoped to be reached by January 1, 1947.

For a complete pictorial presentation of the Park Avenue Theatre in New York, the reader will please turn to the photolithograph section.

For the transient patron, general admission tickets to the unreserved seats will sell for 60 cents each.

The programs, to be changed twice weekly, will be chosen from the product of Columbia, Metro-Goldwyn-Mayer, Paramount, RKO Radio, 20th Century-Fox, United Artists, Universal, and Warners studios, together with foreign-made pictures as are deemed of distinguished merit. The opening attraction, "Anna and the King of Siam," was followed by "Stolen Life."

THE THEATRE ITSELF

The Park Avenue Theatre will be the last word in deluxe motion-picture entertainment. Reade plans to show the 104 best foreign and domestic pictures made each year. This theatre is also equipped with 16-mm. Bell and Howell Company Filmoarc sound projector, enabling the audience to see many educational, historical, and other films never before offered a motion picture audience.

Instead of the usual marquee with bright lights and current coming attraction announcements, this theatre will have a simple canopy over the entrance, the type used in most apartment houses. The only lettering on it is "Park Avenue Theatre."

One enters the theatre through a simply adorned lobby, instead of the usual advertisements in the show cases, there being works of art. These displays are being arranged by the Audubon Artists and will include sculpture, rare jewels, ceramics, and glass, as well as paintings.

The theatre itself is divided into the orchestra and a smoking mezzanine.

On the main staircase is the mural, "The Judgment of Mars," by Oscar Glas, noted Belgian artist, measuring 60 feet long by 16 feet high.

The downstairs lounge of the theatre offers subscribers many unique motion picture theatre innovations, among which is a snack bar where patrons can obtain light beverages, such as tea or coffee, as well as small sandwiches and cakes. Also in the lounge are card tables for backgammon, gin rummy or bridge, the cards and games graciously supplied by the management. For those who wish, there is a DuMont television receiver in this lounge and before or after shows one may enjoy looking at televised programs.

Throughout the 250-seat smoking mezzanine are "love-seats." This is the first time in American theatre history that a two-seater has been used exclusively in any one section of a theatre. These "love-seats" are made by the Lehigh Furniture Company, and are designed to give the comfort of a large overstuffed chair in the space limitations of a theatre row. The frame is constructed of kiln-dried hardwood.

There is none of the usual hair and cotton felt filling used in the upholstery, as the seats and backs are made in a full, no-sag construction and the only filling is a special molded seat and back of Foamex (latex foam rubber). Several models were carefully fabricated by hand before the final set was designed. These are molded and shaped in a manner which gives the greatest comfort and support. The top and front of the arms are also covered with foam rubber slabs for added comfort.

Instead of the wooden outside backs usually found on theatre seats, the backs are covered with the same fabric used on the seats, and are lined with a thin sheet of steel before the cover is applied, so that persons in the row behind will not be able to kick thru the seat backs.

In the orchestra are special rows for those confined to wheel chairs, enabling them to see the show. This is the only theatre—outside the facilities of hospital auditoriums—providing invalids this comfort.

The air conditioning of the Park Avenue Theatre is also unusual. There are nearly 250 tons of equipment for this small house, seating only 586 people. Besides humidity control, there are germ-killing cathode lamps installed in this apparatus to rid the air of harmful bacteria.

In the ladies' lounge, a beauty technician, who is being specially trained by Charles of the Ritz, will aid patrons in the art of make-up, supplying them with cosmetics individually wrapped for their convenience.

Patrons hard of hearing are provided with hearing aids.

There are special telephone accommodations in the theatre so that professional men may be called easily and quickly to the phone.

(Since the foregoing was written, the subscription plan here described has been abandoned and the theatre sold, to become at the year's start the first-run showcase for Universal-International pictures.)

Trend Toward Movie Shows for Children

Story of How Distribution and Exhibition Attempted to Reach the Juvenile Audience

G. F. NONAMAKER
Editor of BETTER MANAGEMENT, *and Associate Editor of* THE EXHIBITOR

Last year was the one in which exhibitors throughout the country began concentrating more than ever before on the holding of children's shows, it having been conclusively proved that therein lay some extra box-office revenue.

Starting with the familiar Cartoon Carnivals, which grew to gargantuan proportions when competition became keen, this feature, which originally meant the showing of an hour or less of repeat cartoons, reached the point where some houses were showing 20 at one show. This almost meant the killing of the goose that laid the golden eggs, since the spurt in the demand for cartoons naturally alerted the distributors, who began to demand their share of the extra profits being derived from this source. Hence, there was a slight increase in the rental of this type of short subject; but the shows still proved mighty profitable for the exhibitors since they were held in advance of the regular day's business and were still relatively cheap to buy.

The growing popularity of the Cartoon Carnival, special Saturday morning programs of animated shorts for children, reached the point where more than 100 theatres in the Warner Brothers circuit alone were putting on these periodical performances. The shows were given about every two months, with tickets sold in advance, and frequently the demand for seats was so great that two or three houses had to be used to accommodate the juvenile turnout. In the larger spots, four or more neighborhood houses in various parts of the city, held the shows simultaneously, with four others in other sections holding them the following week.

The idea gained momentum during the year with as many as 12 neighborhood houses holding them on the same day in the larger cities and all proving successful both from the standpoint of catering to entertainment of the children, who, after all, are the adult patrons of tomorrow, and through whom it is known one reaches the parents; and also from the monetary angle.

It was only natural that the cartoon carnival stunt should develop as it went along. It led in many instances to the formation of kiddie birthday clubs, with perhaps, among the most successful, that of the Skouras Roosevelt Theatre, Flushing, New York, which boasts of 3,000 members.

The kiddie shows also led to the formation of the Children's Saturday Matinee Club in New York, which made its debut at the Beacon Theatre, Broadway near 75th Street, and at the heretofore unheard of admission of 74 cents. This was duly covered in a three-page feature article which appeared in THE EXHIBITOR on February 27, 1946. At that time, it was said that the major reaction of the industry was "Do they really get that price for a ticket?" And it was pointed out that to the average exhibitor, often forced to pad his Saturday afternoon performances to large proportions through the addition of cartoons, serials, westerns, and give-aways, in addition to the regular feature and shorts, for the regular admission or even a special lower price, the idea of getting 74 cents for kiddie show ($7.50 for a book of 15 admissions) seemed "out of this world."

The CSMC, however, proved a success in its Beacon try, and one of the year's most interesting developments in the industry was the launching of it later on a national scale by its New York founder, Frances Gershweir.

The day that the CSMC made its debut at the Beacon was a big occasion for the children, the parents, and the Beacon management, not to mention the two young mothers who had originated the plan. A throng of excited youngsters lined up outside the theatre, peering in to glimpse the clowns, and, tugging at their mothers' arms as they waited eagerly for tickets which were priced, as stated above, at 74 cents. The scene was repeated each forthcoming Saturday until late in April when the CSMC ended its season.

TYPICAL OF THE ADVERTISEMENTS designed for the Cartoon Carnivals is this one-column layout of Lester Pollock for a show at Loew's Theatre, Rochester, New York. Nine replicated series are in the program.

Three shows were given each week, with special entertainment, such as magicians, animal acts, and marionettes, alternating with the selected short subjects and cartoons presented. The enthusiastic response, resulting in good box-office returns, testified to the fact that here, at last, was planned entertainment for children on a successful, businesslike scale.

On the basis of its success, Mrs. Gershweir offered the plan to theatre owners elsewhere with each step of the job, from the initial publicity to the planning of programs worked out. Publicity for local newspapers, theatres, schools, and churches was taken care of from the Children's Saturday Matinee Club's New York office. Included in the plan was a theatre-front montage, made from blow-ups of the enthusiastic New York press notices, and a trailer for the local theatre, announcing to the public that it had been chosen for the project because of its progressive attitude toward the bettering of children's shows. Only one house in a city or town was given the opportunity to use the plan and the name, Children's Saturday Matinee Club.

All films suggested to local theatres were selected from the Schools Motion Picture Committee list by an advisory board of outstanding educators and leaders in the field of children's entertainment. All films were previewed by this board, and by a group of child reviewers. Those which passed this test were bound to be sure box office successes involving a minimum of risk for the exhibitor. In addition, programs for the 20-week series were carefully arranged, on the basis of past experience, so that they included enough humor, excitement, and quiet fun to keep the youthful spectators interested up to the very last minute.

All Children's Saturday Matinee Club theatres started their seasons simultaneously and subscription books of tickets were sold by each theatre, the price of a book varying with the community. A group of consultants from Mrs. Gershweir's New York office worked actively with the theatre managers throughout the CSMC season, to offer advice, and to take care of any problem that might arise.

In offering her plan to theatre owners, Mrs. Gershweir felt that she was filling a need which has long been recognized by leaders in the industry, a need which

had only now been translated into constructive action. She felt that children's shows were timely because of the great wave of interest in children's activities which was sweeping the country. Parents and leaders who were formerly absorbed with participation in the war effort were now turning the flood of civic mindedness in the direction of their own children. Theatre owners were quick to sense this, and responded by offering bigger and better children's shows, and her plan helped.

This, however, was by no means the end of the attention and cognizance given motion picture entertainment for children during the year. Exhibitors who had been searching the film vaults to find film suitable for their special children's matinee showings hailed with delight the announcement that the industry was making available a special series of feature films designed for showing to just such audiences.

This project, known as the Children's Film Library, was a joint undertaking of three non-member and the seven member companies of the Motion Picture Association.

The various laboratories turned out 882 prints of 27 feature reissues to be ready for showing at the beginning of the school year. The features were carefully selected with a view of their suitability for younger audiences at Saturday showings, which would not interfere with the children's school attendance.

It was indicated that the participating companies were prepared to continue and expand the project by adding other features to the list if it proved successful.

The ten companies participating in the library were, non-members, Monogram. Republic and United Artists, and, members, Columbia, MGM, Paramount, RKO Radio, Universal, 20th Century-Fox, and Warners. One print of each of two reissue titles started the library off at each exchange of Monogram and Republic, and one print of each of three reissue titles were available at the exchanges of each of the other eight distributors. National Screen Service prepared a trailer announcing the Saturday morning shows, and listing the 27 titles.

The 27 pictures, all of them approved for children by every reviewing group, were, from Columbia, "Blondie Brings Up Baby," "Five Little Peppers and How They Grew" and "Five Little Peppers in Trouble"; MGM, "Young Tom Edison," "The Human Comedy," and "Adventures of Huckleberry Finn"; Monogram, "The Hoosier Schoolboy" and "The Barefoot Boy"; Paramount, "Alice in Wonderland," "Little Miss Marker," and "Mrs. Wiggs of the Cabbage Patch"; RKO, "Two Thoroughbreds," "Anne of Windy Poplars," and "Anne of Green Gables"; Republic, "Sis Hopkins" and "Young Buffalo Bill"; 20th Century-Fox, "Jane Eyre," "The Poor Little Rich Girl" and "Rebecca of Sunnybrook Farm"; United Artists, "Three's a Family," "Knickerbocker Holiday," and "Song of the Open Road"; Universal, "The Underpup" and "Sandy Gets Her Man"; and Warner's, "Green Pastures," "A Midsummer Night's Dream" and "The Prince and the Pauper."

New York City License Commissioner Benjamin Fielding declared his department would continue to encourage the production and distribution of wholesome film entertainment for young children for Saturday showings. "We heartily endorse the splendid steps taken by the MPA in organizing a Children's Film Library," he said. "Here in New York City I will encourage the use of our motion-picture theatres throughout every neighborhood on Saturday mornings for the showing to children of these specially selected films." Fielding emphasized that "this project marks a growing awareness of the motion-picture industry of their deep responsibility to exhibit suitable pictures to young boys and girls."

THE FOUNDERS of the Children's Saturday Matinee Club are Mrs. Martin Levine (left) and Frances Gershweir. Theatre owners have been quick to respond with bigger and better shows for children.

Thus parents concerned about the film diet of their young children may now rest assured that great classics of literature are available for their screen entertainment through the efforts of Eric A. Johnston, head of the Motion Picture Association, inaugurating the industry's new service to theatres for these Saturday morning screenings.

Since a poll indicated that many theatres regarded Saturday morning children's shows as a non-profit community service, with the added grosses a secondary matter, it is up to Parent-Teacher Associations and other community groups to encourage them by having the children attend. In most cities, mothers or teachers were in the audience to help care for the youngsters and to oversee transportation and traffic and otherwise cooperate with the theatre management.

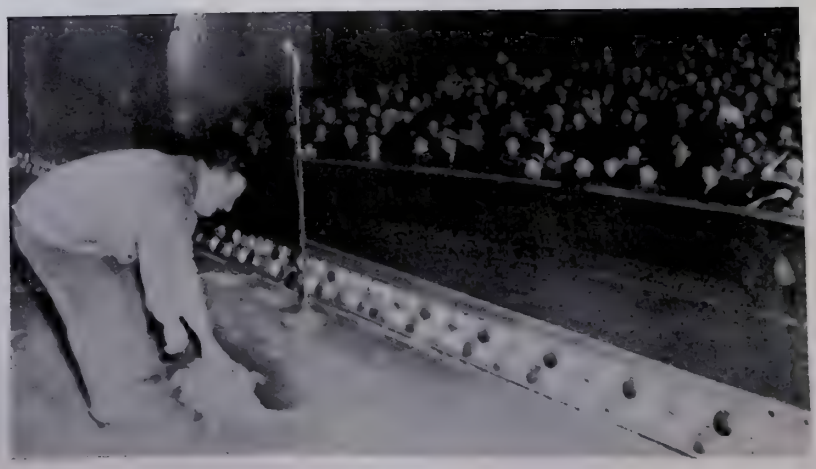
Johnston said, "A whole generation of children has reached school age since these pictures were produced. A motion-picture film, unlike a book, isn't always available on a shelf. In a relatively short time a motion picture goes out of circulation. In undertaking this project, the industry is proud to have a part in introducing to younger audiences some of the photoplays which other children have enjoyed during the past two decades. I have had assurances from many theatre operators that they will make their theatres the Saturday morning headquarters for children in their communities. If parents will encourage the screening of these pictures at Saturday shows, their children, I believe, will be enriched in literature, adventure, phantasy and fun. We present the Children's Film Library with that in mind."

With the year's trend definitely toward bigger and better children's shows it is interesting to note, as Jimmie Fidler, motion picture columnist, pointed out, "The studios are not yet producing films made with youngsters in mind. But if mothers and fathers will now cooperate with local theatres in staging these Saturday shows, the industry will be forced to take notice. The future of matinees for boys and girls may depend upon whether or not the older folks get behind them, and stay behind them."

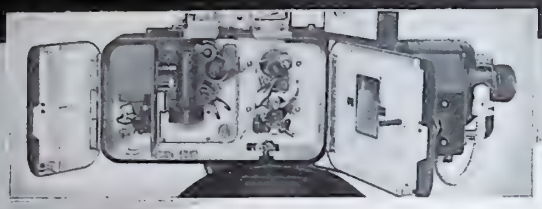
At least, the exhibition and distribution ends of the industry have made an honest attempt during the past year to reach this large and enthusiastic audience.

Another thing that exhibitors contemplating running kiddie shows should take into consideration is the additional money that will be taken in at the candy counters or machines. It is a known fact that the average candy purchases made by youngsters attending motion-picture theatres ofttimes total three sales for each admission.

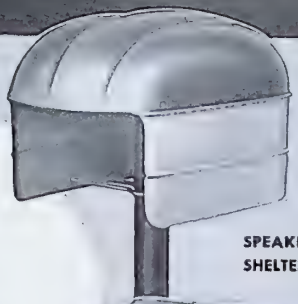
ON THE PROGRAM of each performance of the Children's Saturday Matinee Club is a specialty act, devoted to something which might interest the children. In this particular case, Al Gordon, whose offering is entitled "Going to the Dogs," holds the attention of the younger generation. Other programs have presented magicians, marionettes, and more animal acts. The enthusiastic response, resulting in good returns, attested interest in these shows.



Complete DRIVE-IN THEATRE Equipment!



DE LUXE SOUND MECHANISM



SPEAKER SHELTER

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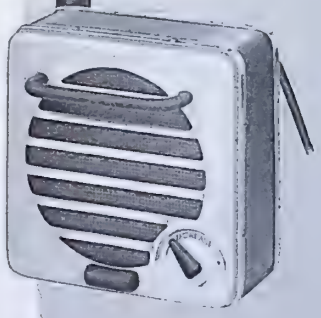
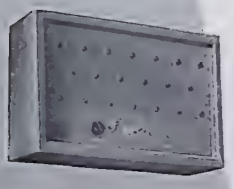


IN-A-CAR SPEAKER



RAMP CIRCUIT CONTROL PANEL

Ask For DRIVE-IN THEATRE PLANNING BOOK—Ask your nearest National Theatre Supply branch for a copy of our new Drive-In Theatre Planning book containing Construction notes—helpful hints—illustrations of essential equipment—and a complete check list of all equipment and supplies necessary.

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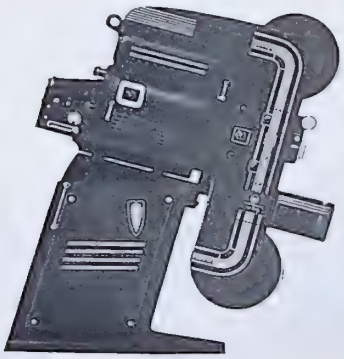
RCA THEATRE EQUIPMENT

Everything for the Theatre!

RCA DRIVE-IN THEATRE EQUIPMENT

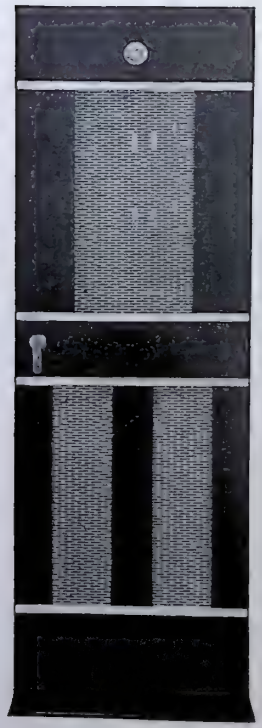
No other application makes greater demands upon picture projection and sound equipment than theatres of the drive-in type whose popularity has progressed by leaps and bounds. The enormous size of these theatres makes efficiency count heavily in the final results.

Because of its sterling quality and highly efficient design, the apparatus made available through RCA Theatre Supply Dealers has been established as the prime favorite for this newest of motion picture theatre entertainment.



DRIVE-IN PROJECTION EQUIPMENT

Utilizing screens vastly larger than indoor theatres, the light efficiency on the part of the projection lamp and projection mechanism used for these theatres assumes greater importance. Brenkert lamps and Brenkert projectors have proved, and are daily continuing to prove in drive-in theatres, that they have the efficiency to match this need. Their rugged construction, with their advanced engineering features make them the best bet for continual high class performance with a minimum of repair expense.



DRIVE-IN SOUND EQUIPMENT

Sound projection systems for drive-in type theatres present an interesting array of layouts suited to a variety of geographical, physical, and legislative requirements. No matter what the preference or the requirement, RCA equipment is adaptable to the situation.

SOUNDHEADS AND AMPLIFIERS

Basic equipment for all RCA sound systems for drive-in type theatres is the big PG-250 amplifier and soundhead equipment. It is conservatively rated at 125 watts minimum and can be easily expanded by the addition of extra output amplifiers up to 360 watts total undistorted output.

The PG-251 uses a 250 watt amplifier which consists of two complete channels, each capable of delivering 125 watts undistorted power output. A switch provided on the rack permits these units to be operated separately, or together, thereby providing complete emergency protection.

LOUDSPEAKERS

There are high quality RCA loudspeakers for every type of loudspeaker installation whether centralized, multiple above ground, or in the car. The best choice rests upon a consideration of all factors. The in-car type, however, has quickly risen to a position of outstanding popularity. First choice for these theatres is the efficient RCA In-Car loudspeaker illustrated above. It combines high quality performance with light weight and extra features making for ease in handling.

FOR FURTHER INFORMATION SEE YOUR RCA THEATRE SUPPLY DEALER

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AMERICANS IS

HARD OF HEARING

THIS VAST AUDIENCE IS YOURS

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Almost 20 million potential movie-goers. But because their handicap prevents them from enjoying motion pictures to the fullest, they often stay away from the theatre – and influence friends and relatives to do the same!

With the Acousticon Theatrephone System in your Picture house, you *attract* these people –add a tremendous *new* audience–a steady and grateful audience. For this amazing aid to hearing permits the deafened to hear every sound clearly and distinctly! Enables them to enjoy the movies once again! Gives them the one big reason that they needed to come to *your* theatre –to come regularly and faithfully and bring their friends and family with them!

The Acousticon Theatrephone System can be installed easily and inexpensively. And besides boosting attendance, it gives your theatre priceless good will and publicity. For there's big news in helping the hard-of-hearing, and local papers gladly carry appropriate press releases. So today, now–write for full details on this wonderful way to zoom *your* box-office receipts! It's new revenue – constant revenue for *your* business.

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1946-47

Notes on Emergency Lighting for Theatres

Small, Individual, Battery-Operated Units Automatically Operate When Current Stops

HAROLD STERLING BIRD
Distribution Manager, Carpenter Manufacturing Company

A Laurier Palace Theatre disaster, a Hartford Ringling circus fire, a Cocoanut Grove horror—these and lesser catastrophies point up laxities we all know exist. Regulations, laws, and inspections are the result. The public had seen to that.

Yet it is the theatre manager, and the auditorium, restaurant, night club, the crowded factory and store owner on whom, in the last analysis, the public depends for its safety when entering any of these places.

There is a multiplicity of laws, ordinances, and regulations—state, city and town—enforced by Departments of Public Safety, Insurance, Police, Labor, by local Fire and Police chiefs, Electrical Inspectors—or enforced by no one or only the consciences of you, the Managers.

We have only to take these laws seriously and follow them faithfully. Our consciences will be clear, then, if disaster does come our way. There is something about a crowded lightless theatre. A shout or cry or the smell of smoke and none can foretell the result.

So emergency lighting must be provided for every area where panic might start.

Not only must every exit be visible but every passage, aisle, almost every seat must have at least some light at all times.

Emergency lighting must be from a source entirely separate from the regular lighting. What good an A.C. and D.C. system if both could fail from the same power plant failure, or the failure of the same wiring and fixtures within the theatre.

Emergency lighting must be automatic. What good are gas jets along the walls or in the stairways for who is going to light them? Are even your best ushers going to fight their way through a scared or possibly panicked theatre to scratch matches and light gas jets? For that matter, should they? That little flame might be just the signal to start that panic off.

Consideration of all sources quickly narrows down our choices to electric battery-operated equipment. There are two types. One is the system with a battery of batteries, usually located in the basement, and with separate wiring to lights throughout the theatre building. These are usually 110-volt outfits ranging in cost from $1,000 to $1,500 and upward almost indefinitely. They require the care of a good man and should be checked thoroughly and frequently for proper operation and condition of batteries. Some of these systems recharge their batteries from the outside regular lighting circuits and others operate by an automatically started gasoline generator. Like any system, these are only as good and dependable as the care given them.

A BATTERY-OPERATED UNIT is the Automatic Minuteman, which is conveniently placed and plugged in. When the power fails, the floodlights are automatically operated from the batteries contained in the case.

During recent years smaller emergency lighting units have gained favor. These are individual automatically operated units with self-contained batteries, that can be plugged in on the regular lighting lines more or less like your refrigerator. These give a surprising amount of light. For example, in the Metropolitan Theatre, in Boston, with its over 4,200 seats, there are only two of these units. Yet, if the regular lights fail, the house would be flooded instantly and automatically from the front row of seats to the back of the second balcony.

These smaller units are inexpensive and easy to install. One can be set at each end of the stage in front of the proscenium or hidden in back and with the lampheads built into the arch or boxes. Four lampheads—the units come with two or even three lampheads each — will take care of almost any auditorium, with extra units or lampheads for back stage or down stairs to dressing room passages.

Any battery system must have means for trying the operation of the lights and testing batteries easily and regularly. The batteries should have built-in-hydrometers, automatic devices for keeping them at full charge, and provision for bringing them back to full charge quickly once they have been used. (Dry batteries are not suitable for this type service. They cannot be recharged, are slow to test and refills are expensive.)

When all is said and done emergency lighting is no longer the expensive thing it once was. Smaller units can be reliable as well as large installations. Any of them must be given reasonable care.

By all means provide your patrons and customers with the protection of some kind of completely separate and reliable emergency lighting service.

TWO INSTALLATIONS show the placement of an emergency lighting at strategic locations. At the left, in the Shubert Theatre, Boston, shows the lights set to flood the auditorium from the end of a stage box. At the right, in Loew's State Theatre, Boston, is seen a dual installation, with one light directed toward the stairs and the other toward the lobby area. Emergency lighting for any size theatre is, indeed, quite a worth-while investment.

Hand Fire Extinguishers for Theatre Use

The How, Why of Fire-Fighting Equipment Are Summarized, with Notes on Servicing

The theatre is crowded. The audience is quietly watching the picture unfold on the screen. Everything seems as usual, but—

In the basement, the large electric motor that operates the air-conditioning system becomes over-heated. Someone failed to give it the proper lubrication and care, and its heavy load causes the bearings to become very hot. Suddenly the whole motor bursts into flame.

The fire spreads rapidly. If it reaches the stairway, and smoke is seen by the audience, mass panic may ensue.

A workman near by, seeing what has happened, dashes over and pulls the main control switch, and then takes down the carbon-dioxide fire extinguisher hanging there and quickly presses the valve. A cold blanket of carbon dioxide shoots from the extinguisher horn, smothering the fire speedily without harm to the motor.

All this happened in a moment's time, without any of the people upstairs even becoming aware of the fire. Yet had the workman failed to act quickly, or had he failed to shut off the power, or had he grabbed the wrong kind of extinguisher, tragedy might have occurred. The carbon-dioxide extinguisher, being a non-conductor, was safe to use on electrical fires such as this one, but the use of a soda-acid or foam extinguisher instead might have resulted in electrocution for the workman. And, of course, pulling the main-line switch was a double protection against electric shock and a guard against the rekindling of the fire.

This incident serves to illustrate what constitutes adequate fire-fighting equipment for all theatres: enough of the right extinguishers in the right places—and personnel trained in their use and operation.

CLASSES OF FIRES

Fire depends on three factors: (1) a substance which will burn; (2) enough heat to make it burn; and (3) enough oxygen to support the combustion. Remove any one of these three factors, and you just naturally put out the fire.

A substance which will burn can sometimes be removed from a fire, but most fires have to be extinguished by reducing the heat or by cutting off the oxygen. To reduce heat, water or water-containing chemicals are used on fires. To cut off oxygen—which is the same as smothering—something that will keep air away from the fire has to be used. Whichever method is better—cooling or smothering—depends on what is burning.

Therefore, in order to be able to choose the correct extinguisher for the various parts of the theatre, it is necessary to know something about the different kinds of fire itslf.

There are three different classes of fires recognized by the National Board of Fire Underwriters, as follows:

Class A fires, or incipient fires which occur in ordinary combustible materials, such as wood, textiles, or paper, and require the cooling effect of water or a water solution for extinguishment;

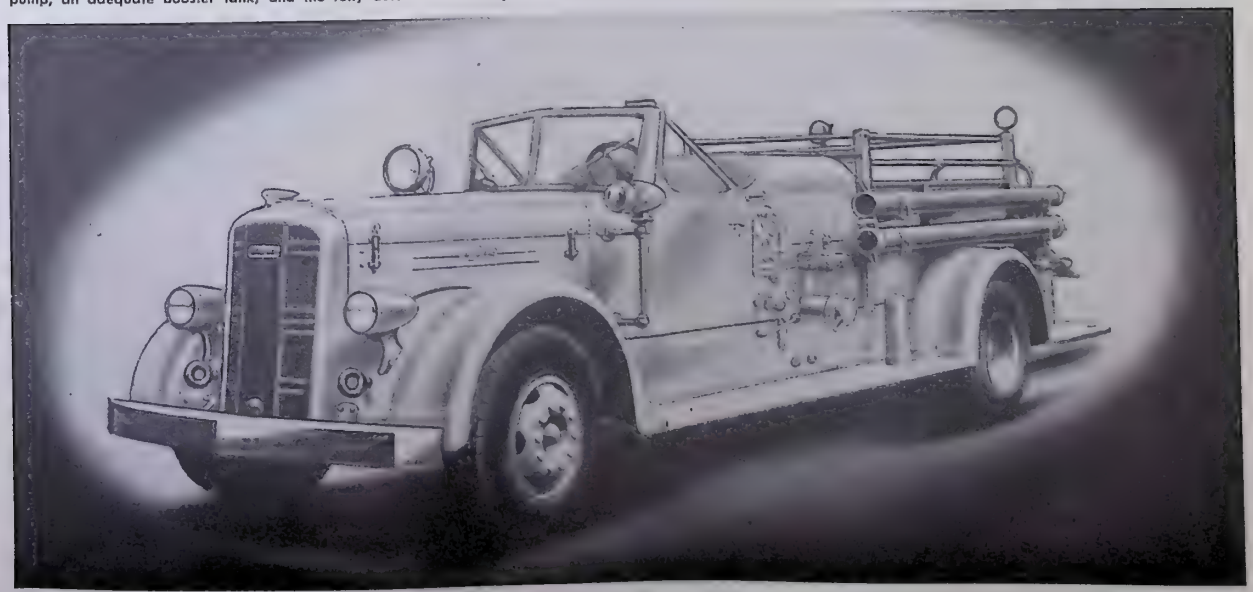
Class B fires, which are incipient fires in small quantities of flammable liquids, such as oils, grease, and so forth, where a smothering or blanketing action is required; and

Class C fires, or incipient fires in electrical equipment, where a non-conducting material is essential.

Of course, there are some exceptions to these rules. For instance, if a per-

This article has been prepared from specially submitted material and from other authoritative sources. Special editorial thanks and appreciation are acknowledged to the following for cooperation on text, pictorial material, and critical review: Robert S. Moulton and the National Fire Prevention Association; E. F. Tabisz and the Underwriters' Laboratories, Inc.; Everett A. Warren and the General Detroit Corporation; W. P. Turnesa and Pressurelube, Inc.; J. A. Sargent and the Ansul Chemical Company; the Ward-LaFrance Truck Division of the Great American Industries, Inc.; and others, who, for reasons of their own, prefer anonymity.

TYPICAL OF FIRE APPARATUS provided by up-and-coming communities for fighting fires is this Ward-LaFrance triple combination pumper. Among the features of especial value are the full-powered, six-cylinder, fire-truck engine, the accurate steering and short-turn radius, the heavy-duty frame, the two-stage centrifugal pump, an adequate booster tank, and the fully automatic clutch operation with ground-position controls. Equipment of this calibre helps to keep down fire insurance rates, and the theatre man should insist that his local fire department be equipped with such modern, efficient fire-fighting apparatus. But he should not forget the hand extinguishers are best for emergency fire fighting. (Photograph courtesy of the Ward-LaFrance Truck Division of Great American Industries, Inc.)



son's clothing catches fire, the best thing is to roll him in a rug or blanket to smother the fire. Or, sometimes, where water would cause serious damage, as in the case of valuable papers or blueprints, it may be better to smother the fire. But, in the great majority of cases, the rules given above will generally apply.

The inspection label of the Underwriters' Laboratories, Inc., that appears on the extinguisher, will be found to indicate the class or classes of fires for which the device is suitable.

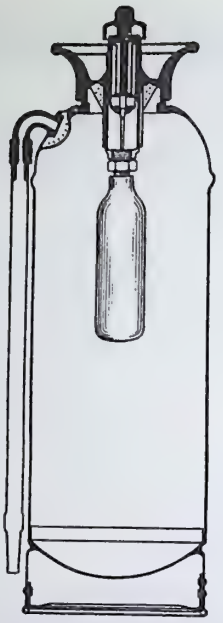
FIRE FIGHTING

Big fires are terrifying, and only professional fire fighters know how to handle them. But every theatre owner, manager, and attache should be prepared to put out a little fire safely, so it can never become a big fire.

The first thing to do when fire breaks out is to collect your wits and size up the situation. This will not take more than a few seconds, and it may keep you from doing some foolish or useless thing.

Immediately call, or send someone to call the fire department. Then go into action with your extinguisher. Take a position near a door, so that any sudden burst of flame cannot trap you. If possible, stand so that the smoke and fire are carried away from you by any drafts. If the fire is in a small room or closet, stay outside and aim the extinguisher agent in at the fire. Take advantage of the length of stream to remain at a comfortable distance from the fire.

Always aim directly at the thing that is burning, not at the smoke or flame, except in the case of flammable liquid. But if fats, gasoline, or other Class B materials are burning in a container, aim just above the level of the liquid, to avoid splashing and spreading the fire.



CONSTRUCTION of the gas-cartridge extinguisher is shown in this Pyrene Manufacturing Company sketch. When the top is bumped on the floor, the gas cylinder is punctured, the carbon dioxide forces out the water.

If the fire is spread out over the floor or ground, start at one end, preferably at the point nearest you, and sweep it out completely as you go. If the fire is traveling up a wall, put out the fire at the bottom first and then follow it up.

In the case of Class C fires, it is desirable to turn off the electric current, if you can, to prevent re-ignition. But, by using the proper type of extinguisher, you will not be in danger of electric shock if you cannot turn off the current.

Many materials give off poisonous gases when they burn, so move about to avoid inhaling the smoke. When the fire is out, open windows to air the place. If you cannot air the place out quickly and easily, get out and stay out until the smoke has cleared away.

SODA-ACID EXTINGUISHERS are operated by inverting. Direct nozzle at the base of the flames. Discharge completely. Soda- acid extinguishers should be used on fires in wood, textiles, rubbish, and similar materials. These extinguishers must not be kept where they will be exposed to freezing temperatures. Extinguishers of the soda-acid type should be recharged immediately, following manufacturer's instructions. (General Detroit photograph.)

"APPROVED" EXTINGUISHERS

Approved extinguishers are the best weapons for fighting small fires. They are made to throw a steady stream of extinguishing agent for several feet, so the operator can stay at a safe distance from the fire. They can be handled by one person, and, if properly maintained, they are always ready for instant use. They do not depend on some outside source of pressure, as does, for example, a garden hose. The extinguisher discharge can be aimed exactly where it will do the most good, in contrast to water in a bucket, which cannot be thrown any distance with accuracy. They are designed only to fight fires, so they are unlikely to be in use for some other purpose when an emergency occurs. And, where certain classes of fires may be expected, you can have a type of extinguisher that is most suitable for that class of fire.

An extinguisher which is "approved" is known to be reliable. In other words, you can judge the reliability of an extinguisher by whether or not it carries the label of the Underwriters' Laboratories or the Factory Mutual Laboratories.

Every extinguisher tested and approved by either or both these laboratories has met the exacting requirements of a safe standard of construction and performance. Such an extinguisher bears one or more of these approved labels.

Such an approved extinguisher does not wear out. It gives years of valuable service if it is maintained according to the manufacturer's instructions. It is made of materials which are expected to stand up under all sorts of conditions. If it becomes damaged, it should be repaired only by the manufacturer, who has the proper equipment and experience for the work.

An extinguisher must, of course, be refilled immediately after use, and regularly cared for and inspected, according to the instructions printed on it by the manufacturer. Although extinguishers do not require a great deal of care, they are no exception to the general rule that mechanical devices have to be serviced from time to time. Do not expect an extinguisher to stand by you unless you give it the atteniton it requires and deserves.

And, after servicing your extinguishers, put them back in their proper places, in locations known to everyone and where you can get at them easily when needed.

NUMBER OF EXTINGUISHERS

The number of fire extinguishers that each theatre should have, in order to be fully protected, will vary according to its size and equipment. The minimum number recommended by the National Fire Protection Association is one for

PUMP TANK EXTINGUISHERS should be placed wherever fires in wood, textiles, rubbish, or papers are likely to occur. Holding extinguisher firm with foot pedal, direct the nozzle with one hand and operate the pump with the other. Drench the entire area. This kind of extinguisher uses water as its extinguishing agent and so should be protected from freezing. Anti-freeze chemicals in proper strength can be added. (General Detroit photograph.)

every 2,500 square feet of floor area, and they should be so placed that it will be unnecessary to travel more than 50 feet from any point in the building to an extinguisher.

In addition to having enough extinguishers available, it is important to provide suitable types near each fire hazard. Selection of the right kind of extinguisher may save lives and prevent damage to property. The inspection label on every Underwriters'-approved extinguisher indicates for which classes of fire the unit is approved and, in this way, serves as a guide to the proper selection of equipment for specific hazards.

Vital, too, is the training of personnel in the handling of fire-extinguishing equipment so that, because of mistakes, time will not be lost in an emergency. Fire, while it may be disastrous wherever it occurs, is apt to be especially so in dimly lighted and crowded buildings. You can protect your theatre by taking every possible means to prevent fire, then arming against its outbreak with plenty of reliable, approved fire-fighting equipment. Your safety program—as well as your entertainment program—should receive first consideration in the management of your theatre.

RIGHT KIND OF EXTINGUISHER

The most common ways to extinguish fires are, as has been noted, cooling, smothering, and separating the flame from the material. Probably the two most often applied are the methods of cooling and smothering, and it is these principles which are basic to the construction of fire extinguishers.

The fact that there are different kinds of fire and different types of extinguishers seems complicated at first. But, actually, it is all quite simple, once you get a picture of the various extinguishers in your mind and know what they contain. To make things even simpler, every extinguisher in a public place, in a theatre, on a bus, and so on, is usually of a type that is right for the kind of materials being protected.

Most extinguishers are made in several sizes, according to the size of the hazard they may be selected to protect. Here only the most common sizes of the six main types of fire extinguishers of value in theatre will be discussed.

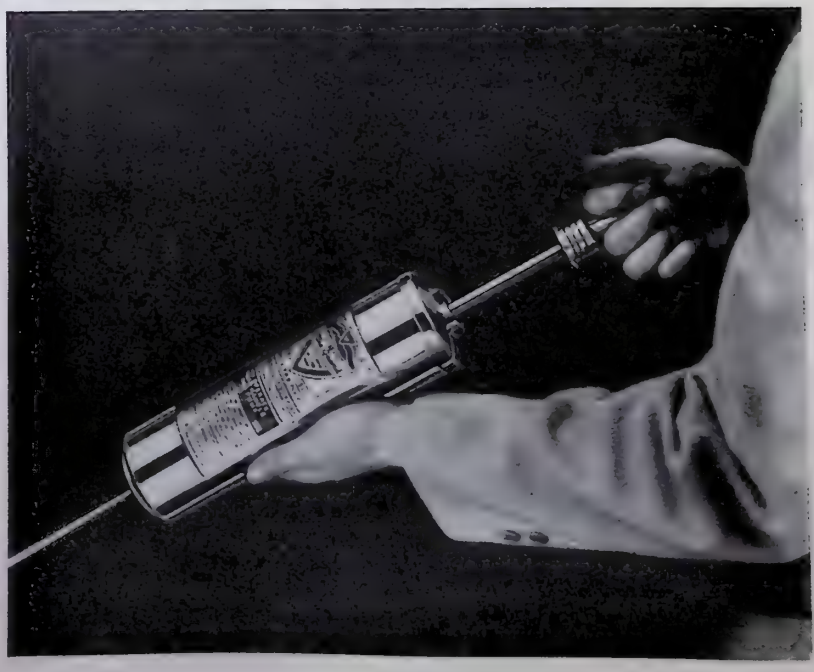
Soda-Acid Extinguishers

The soda-acid extinguisher contains water in which sodium bicarbonate has been dissolved. The bottle in the top of the extinguisher contains sulphuric acid. When you turn the extinguisher upside down, the chemicals mix, forming carbon-dioxide gas, which forces the water out of the extinguisher. The capacity of most extinguishers of this type is 2½ gallons, and they provide a 30- to 40-foot stream which lasts for about a minute.

This extinguisher can be carried to the fire by the ring at the top. To operate it, first take the nozzle between the thumb and forefinger of the right hand. Then, still holding the nozzle, and with the other fingers of the right hand still hooked around the top handle, lift the extinguisher and grab the handle at the bottom with your left hand. Now, turn the extinguisher over, releasing the top handle, but not the nozzle. The extinguisher then hangs upside down in your left hand, and your right hand is free to direct the stream on the fire. For some people, it may be easier to set the extinguisher on the floor, keeping the nozzle in the right hand.

Because the solution emitted consists mainly of water, the use of this type of extinguisher, like the pump tank, is limited to Class A fires. Soda-acid extinguishers may be placed in the lobby, auditorium, entrance hall, and other places where fires in ordinary combustible materials are likely to break out.

VAPORIZING LIQUID EXTINGUISHERS may be used on all Class B and Class C fires. They are small and easy to use. To operate, remove extinguisher from bracket, turn handle either way to release safety lock. Aim extinguisher and use pumping action. Direct stream around the outer edge or side of the burning materials to smother the flame. This type of hand fire extinguisher does not need protection from freezing. (General Detroit photo.)



These extinguishers should not be kept where they may be exposed to freezing temperatures.

Pump-Tank Extinguishers

The pump tank is made in two sizes, 2½ and 5 gallons. Since they contain plain water, such tanks are used only against fires in wood, textiles, rubbish, paper, and similar materials of the Class A variety.

The pump tank is carried to the fire by the top handle. The nozzle is held in one hand, while the pump is operated with the other. By pumping hard, you can make the stream travel for a distance of 30 to 40 feet. The tank can be filled by someone else while it is in use. but you cannot use it while carrying it.

The use of spray nozzles on pump-type extinguishers speeds up the process of atomizing the water so that it can be applied in a finely divided form. Transmission of heat from one thing to another depends in a large part on the exposed surface area. Water in such a finely divided form exposes a great total area to the flame into which it is directed, robs the flame of heat, cools the surface, retards the release of flammable vapors, and combustion ceases.

Extinguishers of the pump type may be used to advantage in the theatre wherever there is danger from fires in stacks of paper, wooden boxes, equipment, and the like. While the vaporizing-liquid and carbon-dioxide extinguishers are fine for electrical fires, even in projection rooms, fires in nitrocellulose motion-picture film are best fought with water or water-solution extinguishing liquids.

Pump-type extinguishers should be protected from freezing. However, when filled with an anti-freeze solution of the proper strength, they will operate at 40 degrees below zero.

The gas cartridge extinguisher looks very much like the soda-acid, and it operates in much the same way, except that, after you turn it over, you have to bump it on the floor. It contains, as the pump-type extinguisher, plain water or water with anti-freeze chemicals, and in its neck is a cartridge of compressed carbon dioxide gas. When the extinguisher is turned upside down and the plunger at the top is bumped against a hard surface (such as the floor), a pin is driven into the cartridge, releasing the gas, which forces the water out through the hose.

The loaded stream extinguisher looks and operates exactly like the gas cartridge, but instead of plain water it contains a special solution of an alkali-metal salt. For some reason that no one understands, the solution is effective on Class B fires, as well as on Class A fires.

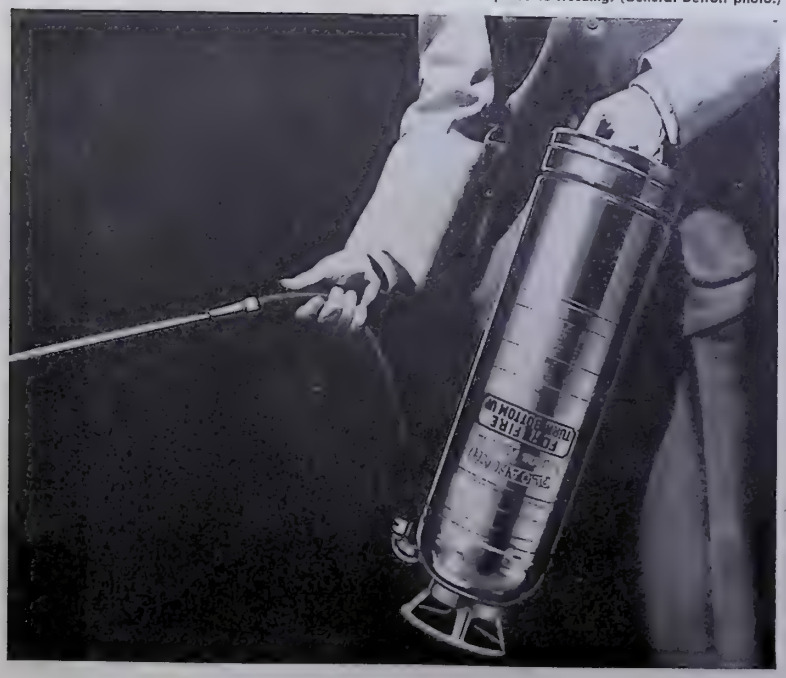
Foam Extinguishers

The foam extinguisher is shaped exactly like the soda-acid and is operated in exactly the same way. But it is different inside and it contains different chemicals. It contains a solution of water, bicarbonate of soda, and a foam-making ingredient in the outer part of the extinguisher, and, in the inner chamber, there is water and aluminum sulphate. When the extinguisher is turned upside down and the chemicals mix, there is generated a foam-like stream which forms a tough, heat-resistant blanket over the burning material. Foam smothers the flame, but it also exerts a cooling effect.

The extinguisher, containing about 2½ gallons of liquids, but generating about eight times that amount of foam, is particularly effective on fires in oil, grease, gasoline, and other flammable liquids. Foam extinguishers may also be used on fires in ordinary materials, and thus have a rating for both Class A and Class B fires.

Extinguishers of this type should be placed near or on the stage of the theatre, in the basement, or anywhere that a Class A or B fire is likely to occur. They can be used under almost any weather conditions, but, because they contain water, extinguishers of this type should not be kept where they may be exposed to freezing, nor should they be used on electrical fires unless the current has been turned off.

FOAM TYPE EXTINGUISHERS are operated by grasping nozzle and inverting extinguisher, causing a strong stream of swift-acting foam to be released. For fires in liquids, allow foam to fall lightly on burning substance. If fire is in an open container, aim stream against opposite wall of tank above liquid level so as not to cause splashing. For other fires, aim at base of the flames. Extinguishers should not be exposed to freezing. (General Detroit photo.)



Vaporizing-Liquid Extinguishers

The vaporizing liquid extinguisher is one of the most familiar types. It contains specially treated carbon tetrachloride, and is operated simply by pumping the handle back and forth. The most common size contains a quart of liquid, and the stream will travel for 20 feet or more, for about 45 seconds.

When the liquid comes in contact with heat, it turns into a heavy vapor, which, like carbon dioxide, is heavier than air and so blankets and smothers the flame by displacing the oxygen immediately surrounding the burning material. Since the liquid is a non-conductor and will not damage electrical equipment, it is excellent for electrical fires, as well as for fires in flammable liquids—that is, Class B and Class C fires.

The most common size, or 1-quart capacity, is light-weight, compact, and easy to handle. The stream will travel for 20 feet or more, for about 45 seconds.

Place vaporizing-liquid extinguishers near lighting fixtures, in the basement, or any other place where a quickly effective agent for putting out small fires is needed.

In using vaporizing-liquid extinguishers, the effects that may result from inhaling vapors and gases should be guarded against, especially in unventilated or confined spaces.

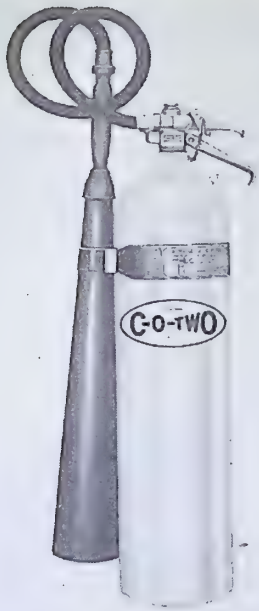
Carbon-Dioxide Extinguishers

Carbon-dioxide extinguishers are filled with liquid carbon dioxide under pressure. When the valve is opened, the carbon dioxide is expelled through a horn-like nozzle in the form of a heavier-than-air vapor, with some carbon-dioxide snow, which smothers the flame by blanketing the burning material. The extinguisher has a maximum range of about 8 feet, but the best results are obtained by playing the discharge as close to the fire as possible, moving the discharge horn slowly from side to side.

Because of the non-conducting properties of carbon dioxide and its smothering action, extinguishers of this type are recommended for use on electrical fires, such as those which might occur in or around machinery and electrical service equipment. Because the gas is heavier than air, it should not be used on fires in ceilings or other places above the reach of the operator.

Since carbon dioxide evaporates completely, leaving no stain on fabrics or other materials, it is valuable for fighting fires in materials which might be damaged by other extinguishing agents.

Since it is the same gas that human beings exhale, carbon dioxide is not poisonous, but when used in unventilated



THE SQUEEZE GRIP, shown on this C-O-Two carbon dioxide extinguisher, is much desired on account of the speed with which the device can be put into action. (Pyrene Manufacturing Company photograph.)

places, such as small rooms, closets, or other confined spaces, operators and others should take precautions to avoid the effects which might be caused by breathing quantities of vapors and gases liberated or produced. This precaution should be heeded to some degree, regardless of what method or what type of extinguisher is used for fighting the fire.

Carbon-dioxide extinguishers may be needed backstage near the control switch, in the lobby, and near machinery in the basement, or wherever Class B or Class C fires might occur.

Dry-Compound Extinguishers

The dry compound extinguisher looks something like the gas cartridge type, but contains a dry chemical extinguishing medium (specially treated bicarbonate of soda) which is ejected through the hose and nozzle, when a cartridge of carbon dioxide is punctured by turning a wheel on the top of the extinguisher. The discharge lasts for 15 to 30 seconds and will travel for a distance of about 8 to 12 feet.

These extinguishers are effective on Class B and Class C fires, and should, therefore, be located where it will be readily available on flammable-liquid fires or fires in electrical equipment.

SERVICING HAND EXTINGUISHERS

Hand fire extinguishers must be kept ready for instant use or they may fail to operate when needed. To maintain them in good working order, they must be inspected frequently, refilled immediately after use, and thoroughly serviced at least once a year.

The annual servicing may be carried on throughout the year by a few experienced men who also take care of recharging. If a large number of extinguishers is involved, the work can be done one at a time by a group especially assigned to this duty. Inexperienced men should be supervised, to assure correct treatment and reassembly of each extinguisher. In no case should so many extinguishers be removed for servicing at the same time as to leave any area without protection.

Soda-acid and foam extinguishers must be recharged annually, if they have not been used in the meantime. Other types are recharged only after use. The tag attached to each extinguisher should show the last date of recharging or annual servicing. Only replacement parts or recharging materials made by the manufacturer of the extinguisher being serviced should be used.

The servicing procedure is briefly outlined below.

Soda-Acid Extinguishers

Be sure the nozzle opening is clear; then invert the extinguisher and discharge the contents. Unscrew the head and examine the gasket, which should be replaced if it is damaged or badly worn. Remove the cage containing the acid bottle, putting aside the stopple for later replacement. Make sure all the extinguisher parts are kept together, so that they may later be returned to their respective units.

Rinse the extinguisher shell thoroughly with warm water, draining it through the hose. Open clogged holes in the hose strainer with a piece of wire. Replace nozzle and hose if badly worn or damaged.

Dissolve the dry chemical in lukewarm water, according to the directions of the recharge package. Pour the solution into the extinguisher shell and bring to the filling mark by adding water. Remove the cork from the new acid bottle and replace it with the stopple from the old bottle. Replace bottle in cage in the extinguisher neck. (If any acid spills on the skin or clothing, wash it off with water.) Rub a little vaseline on the shell threads and replace the head, using only hand power. Be sure the gasket fits snugly against the shell neck.

CAUTION: If the extinguisher looks badly dented, or the seams appear weakened, do not discharge. Instead, remove the head and pour out the contents. Return the extinguisher to its manufacturer or his agent for repair.

Loaded-Stream and Gas Cartridge Extinguishers, operated by gas released from a carbon-dioxide cartridge, should not be discharged for the annual servicing. In these cases remove the head and gasket and inspect parts as outlined under soda-acid. Remove the cartridge and weigh it on an accurate scale. A loss of half an ounce or more indicates leakage and a new cartridge should be inserted. If necessary add water to bring the liquid in the tank up to the filling mark. Then replace the head.

Pump-Tank Extinguishers

Test by operating the pump several times discharging the solution back into the extinguisher tank. A drop of thin lubricating oil may be placed on the piston-rod packing. Bring up the filling mark by adding water if necessary.

Foam Extinguishers

As in the case of the soda-acid discharge the extinguisher by inverting. Remove the head and lift out the inner

CARBON-DIOXIDE EXTINGUISHERS are put into operation by first holding the extinguisher in an upright position. With one hand grasp the horn and direct the nozzle at the base of the flame. With the other hand open the valve. Gradually blanket the entire area. Use them on Class B and Class C fires where a smothering effect is needed to extinguish the fire. Extinguisher needs no protection from freezing temperatures. (General Detroit photograph.)

tank. Rinse the extinguisher, thoroughly draining out the water through the hose. Dissolve the charging material according to instructions on the package, using hot water for the A charge and lukewarm water for the B charge. Pour solution A into the inner cylinder and solution B into the outer tank, bringing both up to filling marks by adding water. Replace stopple on the inner tank and return to extinguisher shell. Replace head, as for the soda acid.

Vaporizing-Liquid Extinguishers

Test the action by pumping some of the contents into a clean, dry container, and return the discharged liquid. In the case of the pump-gun types, add more liquid, if necessary, to bring the level to within half an inch of the top.

Never recharge a vaporizing-liquid extinguisher with ordinary carbon tetrachloride or water, as either will cause corrosion. Do not lubricate any part of the extinguisher.

Carbon-Dioxide Extinguishers

Examine the hose and horn for defects and see that the seal on the operating valve is intact. Weigh the unit. If there is a loss of weight, the extinguisher should be recharged. Recharging service is offered by the manufacturer of the extinguisher (or his agent) or by carbonic-acid plants.

Dry-Compound Extinguishers

When the all-in-one dry chemical extinguisher has been discharged and is ready for recharging, it is inverted and the nozzle squeezed to release the remaining gas pressure, a procedure which also helps to blow out the hose. To recharge simply fill the extinguisher through the fill opening at the bottom of the extinguisher. When the chemical reaches the fill hole, the extinguisher is fully charged. Do not add additional chemical by packing. Replace the cap, and make sure the gasket is tightly seated.

To change the gas cartridge, remove the headring, unscrew the empty cartridge by turning to the right. Turn the handwheel to the right as far as it will turn. Insert the lock pin, then screw the full cartridge in place. The hexagon nut on the cartridge should be within 1/16 inch of rubber gasket for the cartridge to be properly screwed in. Replace the headring, and make sure the gasket is tightly seated.

In the type of dry-chemical extinguisher with the gas cartridge outside the dry chemical tank, the procedure is equally simple. By unscrewing the sleeve nut, that attaches the gas cylinder and the diaphragm valve to the extinguisher, the operator can quickly remove the cylinder and the valve as a unit, and replace it with a fully charged unit.

Since there is an accumulation of pressure remaining in the extinguisher, this pressure must be released before opening the powder chamber. The operator should first invert the extinguisher and stand it in its ring cap. The squeeze-grip valve at the end of the hose is slowly opened, releasing the accumulated carbon-dioxide gas pressure without further loss of the dry chemical. The extinguisher is then returned to an upright position and sufficient dry chemical added to bring the chamber up to capacity.

The large recharging opening of the powder chamber permits rapid refilling (which can be done at the site of a fire). It is only necessary to remove the cap from the top of the container and pour with a full charge of 15 pounds or whatever may be necessary. In cases where only a small quantity of powder had been used to extinguish a fire, the powder chamber should be filled immediately to its capacity.

DRY-COMPOUND EXTINGUISHERS are carried to the fire in an upright position. They are normally equipped with a nozzle valve for controlling the discharge after the stored gas pressure is released into the powder chamber. Extinguisher must not be inverted when being operated. (Ansul Chemical Company photograph.)

ANOTHER TYPE of dry-chemical extinguisher, with the carbon-dioxide tank attached outside the chemical chamber, is this All-Out extinguisher. The principle of operation is quite like that of the Dugas. The extinguishers of this type are valuable on Class B fire hazards in the theatre. (Pressurelube, Inc., photograph.)

Fire Underwriters' Film Safety Standards

All of the National Board's Regulations On the Use of Nitrocellulose M. P. Film

NOTE

This pamphlet supersedes the edition of August 15, 1931 as amended by the supplement of September 15, 1936.

DEFINITIONS

The word "approved" as used in these standards means acceptable to the inspection department having jurisdiction: it means installed in accordance with standards of the National Board of Fire Underwriters pertaining thereto and, when referring to appliances, means tested and found suitable for installation and use. The inspection department having jurisdiction will determine the correctness of installation and use.

Underwriters' Laboratories, Inc., tests devices and materials for compliance with the standards of construction and performance established by the Laboratories and with regard to their suitability for installation in accordance with the appropriate standards of the National Board of Fire Underwriters. Such devices and materials are listed in the following publications:

List of Inspected Fire Protection Equipment and Materials,
List of Inspected Gas, Oil and Miscellaneous Appliances,
List of Inspected Electrical Equipment,
List of Inspected Appliances Relating to Accident Hazard, Automotive Equipment, and Burglary Protection.

Copies may be obtained from inspection departments or from Underwriters' Laboratories, Inc., Chicago, New York or San Francisco.

Many products may be identified by the Laboratories' label, indicating both listing and factory inspection of current output.

A device or system having materials or forms different from those detailed in these standards may be examined and tested according to the intent of the standards and if found equivalent may be approved.

In these standards those provisions which are considered essential for adequate protection of life and property from fire are indicated by the words "shall" and "must."

The words "should" or "preferably" indicate advisory provisions, concerning which the inspection department having jurisdiction should be consulted.

INTRODUCTION

1. Application of Rules.—These regulations are intended to apply to the storage and handling of nitrocellulose motion picture film, in all places except establishments manufacturing such film and storage incident thereto. They are not intended to apply to the storage and handling of film having a cellulose acetate or other approved slow-burning base nor to photographic and X-ray film. (See separate regulations on Photographic and X-ray Film.)

2. Scope of Regulations—(a) These regulations are intended to provide reasonable provisions for the storage and handling of motion picture film, based on minimum requirements for safety to life and property from fire.

(b) It is strongly recommended that film exchanges, laboratories and studios be permitted only in sprinklered buildings of fireproof* construction. In buildings of non-fireproof construction which have been adapted to such occupancies, automatic sprinklers should be installed as hereinafter specified and suitable fire cut-offs provided between each room in which film is handled or stored and other sections of the building, and adequate exit facilities provided. Suitable requirements will be found in the Recommended Building Code of the National Board of Fire Underwriters.

*The term "fireproof" is used as defined in the Building Code of the National Board of Fire Underwriters and as having in these regulations the same meaning as the term "fire-resistive" as used by the National Fire Protection Association.

3. Arrangement of Regulations.—(a) These regulations are divided into two parts: Part I gives general provisions regarding the storage and handling of film; Part II gives special provisions for special occupancies as motion picture theatres, exchanges, laboratories, and studios, which apply in addition to any and all of the general provisions which may also be applicable.

(b) The grouping of the special provisions under the heading of special occupancies is merely for convenience in the application of these regulations. Any particular process or operation in any type of occupancy shall be governed by the provisions given for that process or operation, whether under the heading of that occupancy or any other heading, unless otherwise specifically provided herein. For example, any process in a studio which, from the standpoint of the authority enforcing these regulations, partakes of the same nature as some process covered under laboratories, shall be governed by the provisions for that process given under laboratories.

4. Approval of Plans.—Before constructing any building for use as a motion picture film occupancy, or remodeling any building for such occupancy, or building any film vault, or installing any enclosure for motion picture projection, or installing any screening room, complete plans of such proposed construction or installation should be submitted to the inspection department having jurisdiction for approval. These plans shall show in detail all proposed construction and structural changes and the means of protection to be provided, the heating system with the protection for it, the electrical equipment, and the character and location of exposures.

5. Definitions. — Whenever used in these regulations the following words shall be construed as having the meanings given below.

(a) "Film" or "motion picture film," motion picture or sound recording film having a nitrocellulose base, whether in the form of unexposed film, positives, negatives, scrap, or used film.

(b) "Vault," a vault constructed and equipped in accordance with the requirements of Section 17.

(c) "Cabinet," a cabinet constructed and equipped in accordance with the requirements of Section 16.

(d) "Standard roll," a roll of film $1\frac{3}{8}$ inches (35 mm.) wide and 1,000 feet long, weighing approximately 5 pounds, used as a unit in calculating the weight of film.

NOTE—This definition is intended to establish a measure of length and weight and is not designed to prohibit the use of double rolls (2,000 feet) of film in theatres and exchanges.

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The accompanying reprinting of the National Board of Fire Underwriters' Pamphlet No. 40—and the use of the illustrative material—has been made possible through the cooperation and by permission of the National Board and its assistant chief engineer, C. A. Hutson.

(e) "Partition," except where some other form of construction is specified, a partition constructed in accordance with the specifications given in sub-section 112.

PART I: GENERAL PROVISIONS REGARDING THE STORAGE AND HANDLING OF MOTION PICTURE FILM

Section 11—Construction and Arrangement of Building

111. Motion picture film should preferably be stored or handled only in buildings of fireproof construction.

112. Partitions. — (a) All rooms in which motion picture film is stored or handled, except motion picture projection rooms and film vaults, shall be separated from each other and from all other parts of the building by partitions of suitable stability and having a fire retardant classification of not less than 1 hour as determined by the Standard Fire Test. Partitions constructed as follows shall be deemed to have the required fire retardant classification:

(1) Hollow clay tile laid in cement mortar, cement lime mortar or gypsum mortar, not less than 4 inches thick and plastered on both sides with not less than ½ inch of gypsum mortar or cement mortar;

(2) Gypsum blocks, either solid or hollow, laid in gypsum mortar, not less than 3 inches thick and plastered on both sides with not less than ½ inch of gypsum mortar;

(3) Metal lath supported by incombustible studs, plastered on both sides to fully cover the metal lath and studs with not less than ¾ inch of gypsum mortar or cement mortar and having a total thickness of not less than 2½ inches;

(4) Wood studs covered both sides with metal lath and ¾ inch gypsum mortar or cement mortar, and having a total thickness of not less than 5¼ inches. (This type of construction to be used only in buildings not of fireproof construction.)

(b) Partitions shall be continuous from floor to ceiling and securely anchored to walls, floor and ceiling.

(c) Openings in partitions shall be protected by approved fire doors of a type suitable for use in Class C situations as defined in the Regulations for the Protection of Openings in Walls and Partitions Against Fire.

113. In buildings not of fireproof construction, all rooms in which motion picture film is stored or handled shall have floors and ceilings of at least double ⅞-inch tongue and groove boards, or the equivalent.

114. Exits.—It is essential that all rooms in which film is handled be provided with adequate aisle space and safe means of egress. Aisle space should not be less than 30 inches clear wherever walking is necessary. Rooms in which film is handled and in which more than two persons work shall have two or more exits, remote from each other. Every exit shall be marked "Exit" in letters not less than 6 inches high, or by an illuminated sign with letters of the same height.

115. Vents.—All new buildings erected to be used for film occupancy, and all existing buildings remodelled for such occupancy, except projection rooms (subsection 191), rewind rooms (paragraph 212) and rooms associated therewith (paragraph 213(a)4), shall be provided in every room where film is stored or handled, with vents that will open automatically in case of fire. These should be of ample size; they may be in the form of automatic skylights or automatic-opening window sash. All rooms in which film is stored or handled in existing buildings shall be provided with such vents wherever practicable.

116. Spacing of Workers.—A feature which often contributes materially to the hazard to life in film handling rooms is the congestion of workers together with large quantities of film. To prevent such congestion of workers and the attendant hazard to life, the number of persons working in a room where film is handled should never be more than will result in a ratio of floor area to number of workers, less than 35 square feet per person. Not over 15 persons shall work at one time in any one room (not including the stage of motion picture studios) in which film is handled.

117. Tables and Racks.—Tables and racks used in connection with the handling of film (joining, inspection and assembling tables for example) shall be of metal or other non-combustible material. They should be kept at least 4 inches away from any radiator or heating apparatus. Tables shall not be provided with racks or shelves underneath them, which might be used for keeping film or other materials.

Section 12—Electrical Equipment

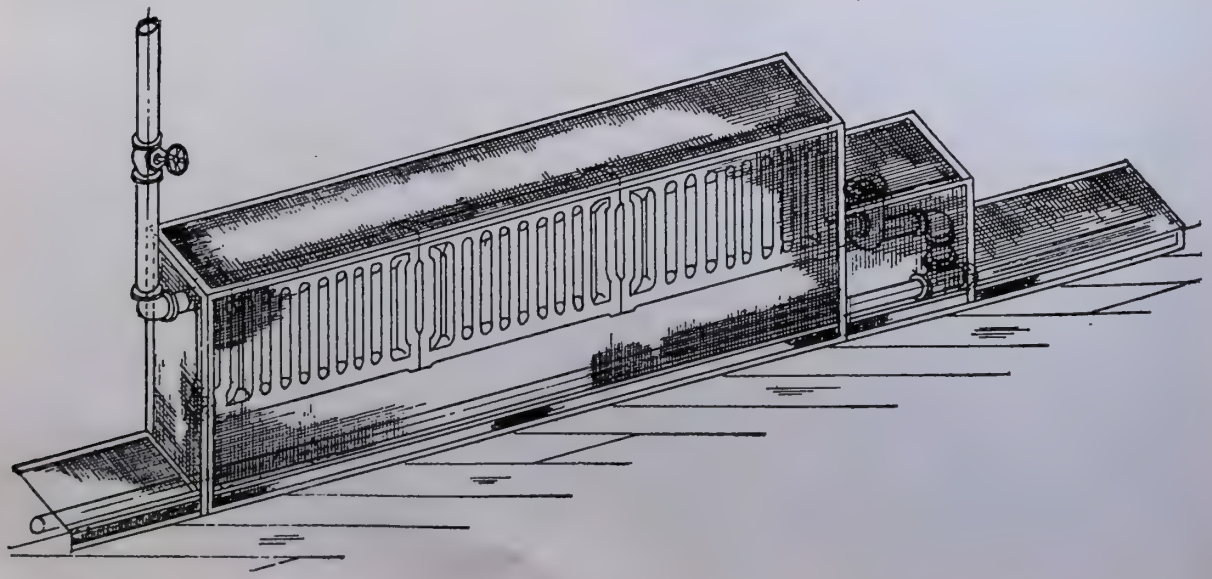
121. Artificial illumination in any room where film is handled or stored shall be restricted to incandescent electric lights, except that arc lights or other forms of electric lights may be used in studios.

122. All electrical wiring and equipment shall conform to the National Electrical Code. The wiring method shall be rigid metal conduit or other approved type of metal raceway. Fuses shall be enclosed.

123. Light fixtures shall be firmly fixed in place, and lights shall be protected by vapor-tight globes. All lights shall be equipped with keyless sockets and operated by wall switches.

124. Light boxes reading "EXIT" in letters not less than six inches in height shall be placed at the exits of all dark rooms.

METHOD OF GUARDING RADIATORS. The guard is of ¼-inch galvanized steel wire cloth of 20 gauge. The bottom is hinged to lift up for cleaning purposes. The top of the guard slopes, so that articles placed thereon will slide off, making it impossible, of course, to use the top as a shelf. Guards are to be constructed so that no film can come within 4 inches of the heating surface. They must be made with a substantial metal frame work which will prevent the wire mesh being forced against the radiator or pipes. All radiators, heating coils, and pipes and returns that are near the floor must be guarded to prevent the accumulation of combustible material.



125. Portable electric lights on extension cords shall not be used in any room in which film is handled or stored, other than the stage of motion picture studios, except that in emergency such portable lamps may be used if equipped with approved keyless sockets and metal protective lamp guards, and having rubber-covered cords of the Hard Service (type S) or Junior Hard Service (type SJ) varieties, with suitable locking plugs.

126. Motors shall be of the non-sparking type, or shall be of an enclosed type, so arranged as to minimize the danger of sparks.

127. Motion picture projectors and other associated electrical equipment shall be of approved type and safeguarded in accordance with the requirements of the National Electrical Code.

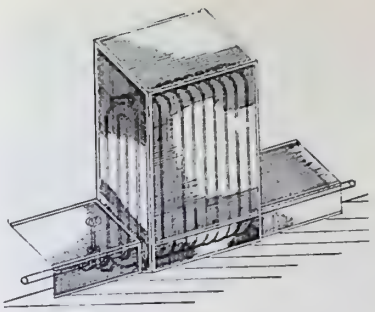
Section 13—Heating Equipment

131. Artificial heating in any building or room, other than a vault, in which motion picture film is used, handled or stored, shall be restricted to steam not exceeding 15 pounds pressure or hot water, provided, however, that this shall not be construed as prohibiting the installation of an indirect system employing high pressure steam when the radiators or heating coils of such system are not located in the room or rooms to be heated. Heat generating apparatus shall be in a separate room.

132. All steam pipes within 6 feet of the floor, and where passing through partitions or racks or near woodwork, shall be covered with approved pipe covering. All radiators, heating coils, and pipes and returns that are near the floor or are so located as to permit any combustible material, waste or dirt to come in contact therewith shall be guarded and protected by means of ¼-inch mesh galvanized steel wire cloth No. 20 B. & S. Gauge, or by its equivalent. The bottoms of such guards shall be arranged so as to lift up for cleaning purposes and the tops to slope so that guards cannot be used as shelves. Guards shall be so constructed that no film can come within 4 inches of the heating surface, and shall be made with a substantial metal framework which will prevent the wire mesh being forced against the radiator or pipes.

133. Air conditioning, warm air heating, air cooling and ventilating systems employing ducts shall be installed in accordance with the "Regulations on Air Conditioning, Warm Air Heating, Air Cooling and Ventilating Systems." In addition to the fire dampers required by said regulations, approved automatic fire dampers shall also be located at such points as may be necessary so that, as far as the duct system is concerned, each room in which film is handled is cut off by dampers from every other room, including those where film is handled as well as those where film is not handled. (See Par. 191(g) regarding ventilation of projection rooms.) Any system used for air conditioning a film vault shall be entirely independent, with no duct connecting to any other vault or room.

NOTE—Ordinary hot air furnaces are prohibited. Gas, oil and electric heaters are prohibited in rooms where film is handled or stored.



ANOTHER METHOD, a variation of the previous one, is shown for guarding radiators and heat-conducting pipes. Pipes within 6 inches of the floor or passing through partitions or racks must be properly covered.

Section 14—Sprinklers and Other Fire Protection Appliances

NOTE—See sub-section 175 regarding sprinklers in film vaults.

141. Every room in which film is stored or handled in quantities greater than 50 pounds (10 standard rolls), except in motion picture projection booths or rooms and rewinding rooms connected therewith, shall be equipped with an approved system of automatic sprinklers. Buildings or sections of buildings used as exchanges, laboratories or studios shall be equipped with automatic sprinklers, as provided under sub-sections 221, 231 and 241. All buildings used for the storage or handling of film should be completely equipped with automatic sprinklers.

142. The spacing of sprinkler heads in all sections where film is handled shall not exceed one head for each 64 square feet, with heads and lines not over 8 feet apart; provided, that in the stage section of motion picture studios the spacing of sprinklers shall not exceed one head for each 80 square feet. In existing buildings where the spacing of sprinkler heads exceeds that specified above, the inspection department having jurisdiction may require the installation of additional heads wherever the hazard of some machine, process, or accumulation of film warrants such protection.

143. (a) Water supply shall be provided acceptable to the inspection department having jurisdiction.

(b) Water supplies for automatic sprinklers shall be based on an estimate of 20 gallons a minute per head for 20 minutes for the total number of heads in one vault, plus 25% of the number of heads in the largest fire area. (A fire area is regarded as an area cut off by brick or concrete walls having a minimum thickness of 8 inches. Each opening in these walls to be protected by one self closing fire door, Class A type.)

144. Every room in which film is stored or handled, except film vaults, shall be provided with first aid fire appliances of types using water or water solutions.

NOTE—Small hose equipment is recommended, and the following types of extinguishers are considered suitable: Soda acid, calcium chloride, pump tank, and loaded stream.

See Regulations on First Aid Fire Appliances, and Standpipe and Hose Systems.

Section 15—Storage of Film

151. The storage of motion picture film, not in process or being worked upon, and except as hereinafter specifically provided shall be in accordance with the following rules:

(a) Except as provided in paragraph (b),

(1) Amounts in excess of 25 pounds (5 standard rolls) but not in excess of 1,000 pounds (200 standard rolls) shall be kept in approved cabinets if not in vaults;

(2) Amounts in excess of 1,000 pounds shall be kept in vaults;

(3) Storage for any considerable length of time should be in vaults only.

(b) Unexposed film enclosed in the original shipping cases, conforming to I.C.C. regulations with each roll in a separate container, shall be kept in a sprinklered room, and if over 5 cases aggregating in excess of 750 lbs. (150 standard rolls) shall be kept in a sprinklered room used for no other purpose.

152. Valuable negatives shall be stored in vaults used only for such film, in suitable heat-insulating containers designed to minimize water damage.

NOTE—The above paragraph being principally concerned with safeguarding values would not need to be inserted in an ordinance.

Section 16—Film Cabinets

161. Construction.—(a) Cabinets including doors shall be of a type of construction approved by the inspection department having jurisdiction.

NOTE—Cabinets may be of approved metal construction, or may be built into the building with a type of construction listed under partitions, sub-section 112 (a) 1, 2 or 3, if otherwise conforming to the provisions of this section.

(b) Cabinets shall have a capacity of not in excess of 375 pounds of film (75 standard rolls).

(c) Racks in the cabinet shall be of metal and so arranged that containers will be stored on edge only.

(d) Doors shall close tightly against the jambs, and should be so arranged as to remain normally closed and latched.

162. Vents.—(a) Cabinets having a capacity of over 50 pounds of film (10 standard rolls) shall be provided with a vent from each compartment to the outside of the building. The vent shall have a minimum effective sectional area of 14 square inches per 100 pounds of film capacity. For long lengths of vent pipe a larger size may be necessary to take care of friction loss and turns in the pipe.

(b) Vent flues shall be of construction equivalent to 18 U.S. gauge riveted sheet metal, and where inside the building shall be covered with 1 inch of approved heat insulating material.

163. Sprinklers.—(a) Cabinet holding over 75 pounds of film (15 standard rolls) shall be provided with at least one automatic sprinkler; provided, however, that a cabinet constructed so that each roll is in a separate compartment and will burn out without communicating fire to film in any other compartment, need not be provided with an automatic sprinkler.

(b) Cabinets of not over 125 pounds capacity for use in projection booths and rewinding rooms only, may have the required sprinkler head connected to the house supply by not less than ¾-inch

pipe, provided the water pressure at that elevation be not less than 15 pounds, and is sufficient to supply not less than 15 gallons a minute.

164. Film in cabinets shall be in individual roll containers or in I.C.C. shipping containers. Materials other than film shall not be stored in the same cabinet with film.

Section 17—Film Vaults

171. Construction.—(a) Vaults shall be constructed in accordance with plans submitted to and approved by the inspection department having jurisdiction.

(b) Vaults shall not exceed 750 cubic feet in inside dimensions.

(c) Walls and floor shall be constructed of not less than 8 inches of brick, 6 inches of reinforced concrete, or of 12 inches of hollow tile plastered on both sides with cement plaster to a thickness of at least ½ inch; they shall be without cracks or holes permitting escape of gases of combustion into the building.

(d) Vaults shall be supported by masonry or steel of sufficient strength to carry the load safely. Beams shall rest at both ends on steel girders, iron or steel columns, or walls or piers of masonry. The supports shall afford at least 4 hours' protection as determined by the Standard Fire Test. Hollow tile shall not be used for foundation walls or for walls of other than the top vault where vaults are superimposed.

(e) The roof shall be of reinforced concrete at least 6 inches thick; where the floor or roof above is equivalent to this, it may serve as the vault roof; a heavy wire screen of not less than 2 inch mesh, or its equivalent may be installed below the required roof to limit the interior vault space to 750 cubic feet.

(f) Vaults shall be provided with suitable drains or scuppers to the outside of the building.

(g) Proximity to stacks and other sources of heat shall be avoided.

172. Doors.—Door openings shall be protected with approved fire doors, one on each face of the wall.

NOTE—Vaults may have two door openings. Such an arrangement is often a great convenience, as in laboratories, where the vault is located between rooms and used for the temporary storage of film in process.

Doors shall be of the type suitable for use in Class B situations as defined in the Regulations for the Protection of Openings in Walls and Partitions Against Fire. The interior door shall be automatic. The outer door shall be of the swinging type and close into an approved frame or otherwise made tight to prevent the passage of flame around the edges. It shall be self-closing, and if fastened open shall be arranged to close automatically in case of fire originating in or out of the vault. Approved quick-operating devices for closing vault doors are recognized as having advantages over the fusible link, and their use is recommended.

173. Vents.—(a) Each vault shall be provided with an independent vent having a minimum effective sectional area of 140 square inches per 1,000 pounds of film capacity (equivalent to 70 square inches per 100 standard rolls). The vent area for a vault of 750 cubic feet shall be not less than 1,400 square inches.

FILM STORAGE VAULT, showing the construction of racks and installation of partitions, baffles, sprinklers, and vent. The vaults must not exceed 750 cubic feet in inside dimensions. The walls have to be not less than 8 inches of brick, or 6 inches of reinforced concrete, or 12 inches of hollow tile plastered on both sides with a cement plaster at least ½-inch thick. The walls are to be without cracks or holes permitting escape of combustion gases.

NOTE—In determining the proper vent opening, allowance must be made for the window frame and sash, for the area of the glass is considered the effective sectional area of the vent opening.

(b) Vent flues inside the building shall be constructed of 5 inches of reinforced concrete or of a construction equivalent to that required for smoke chimneys. Exterior flues shall be of a construction equivalent to that of smoke stacks.

(c) The outlet of each vent shall be above roof or shall be made to face street, court or other clear opening which will give a distance of at least 50 feet to any window or other opening exposed thereby and not in the same plane, and a distance of at least 25 feet to any fire escape on the same or higher level.

(d) Vaults, especially those having a vent in the form of a window, shall be arranged in some manner which will protect the film in the vault against ignition by,—

(1) Rays of the sun, whenever the film in the vault is exposed to direct rays of the sun entering through the vent. This may be done by painting the glass in the vent opening a dark color;

(2) Radiated heat entering through the vent opening, as from an exposure fire, whenever the vent is severely exposed by buildings or storage of combustible material, or by other openings in the same wall.

NOTE—To effect the above protection, one method which has been used employs two baffle walls inside the vault. The baffle wall nearer the vent should extend from the ceiling down to within about 3 feet of the floor, and the inner baffle wall from the floor up to within about 3 feet of the ceiling. Baffle walls should be of substantial construction and should be so spaced and arranged as to afford the full required vent area from the film storage space to the outside.

(e) Each vent shall be protected against the weather by single thickness glass (1/16 inch thick), in a sash arranged to open automatically in case of fire by the means of an approved releasing device placed inside the vault. The use of approved quick operating devices is recommended. The area of the glass shall be the effective sectional area of the vent opening. No pane of glass shall be smaller than 200 square inches. Any protection equivalent to the above may be accepted in lieu thereof.

(f) A light wire screen not coarser than ⅛ inch mesh shall be placed in each vent. Bars or screen designed to prevent burglary or injury to contents shall not have a mesh of less than 4 inches, shall be located inside the light wire screen, and shall give a net opening equal to that called for in (a). Bars and screens shall be so arranged as not to interfere with the automatic operation of the sash.

(g) Film vaults shall not be provided with skylights or glass windows other than as specified for vents.

174. Racks.—Racks in film vaults shall be of metal or other incombustible material and arranged for the storage of single reel containers on edge or for I.C.C. shipping containers. Negatives need not be stored on edge. Vertical incombustible partitions equivalent in durability and heat insulation to ⅝-inch hard asbestos and extending from floor to top of rack shall be provided to divide

racks into sections not over 3 feet wide and so placed as not to obstruct distribution from sprinkler heads. Racks shall not obstruct vent openings.

175. Sprinklers.—Vaults shall be protected by an approved system of automatic sprinklers, with a ratio of one head to each 62½ cubic feet of total vault space. A vault of 750 cubic feet shall have 12 sprinkler heads. Sprinkler heads shall be arranged to give uniform distribution within the sections formed by the above mentioned partitions. They shall be separated by sheet-metal baffles extending below the sprinkler deflectors. With an approved automatic sprinkler system with open heads is permitted by the inspection department having jurisdiction, the baffles between heads may be omitted.

176. Lights.—All lights in film vaults shall be at the ceiling and of the fixed type, with vapor-proof globes and conduit wiring. All switches shall be outside the vault and should be arranged with a small pilot light to indicate on outside of vault whether vault lights are on or off.

177. Heat.—Heating, when required to prevent sprinkler pipes freezing, shall be by hot water or low pressure steam with automatic control limiting steam pressure to 10 pounds and the vault temperature to not in excess of 70° F. Radiators shall be placed at the ceiling, over aisle space with pipes and radiators protected with wire guards so arranged that no film can be placed within 12 inches of such pipes or radiators.

178. All film in vaults shall be in containers, either in single-roll containers which shall be kept on edge on racks only, except that negatives need not be stored on edge, or in I.C.C. shipping containers which may be kept on the floor. Materials other than film and film cement shall not be stored in the vault.

Section 18—Handling of Film

181. Film Shall Be In Containers.—All film shall be kept in closed containers except during the actual time it is being worked upon or examined. This is very essential from the standpoint of fire hazard and safety to life. I.C.C. shipping containers and individual containers for each roll of film with proper corrugations on each side are recommended.

182. Film shall not be placed or kept under benches, tables, or other surfaces which would shield it from the discharge of sprinklers.

183. Scrap Film.—Scrap film shall be kept separate from waste paper and other rubbish, and shall be kept under water at all times. It shall be collected from work rooms at least once daily, and removed to a room used for no other purpose, where it shall be kept under water in steel drums with tight covers. These drums shall be disposed of at frequent intervals. Discarded film in full or part rolls shall be kept in vaults. Scrap film shall not be baled or burned.

NOTE—Motion picture film in the form of clippings and short lengths is in a very hazardous form. Safe precautions in the handling of such scraps are most essential. Baling and burning of film are processes offering a distinct fire hazard. Sending film to a central reclaiming plant in lieu of burning is recommended.

184. Transportation.—(a) Motion picture film should never be transported in any vehicle or other public conveyance used for the transportation of passengers, unless enclosed in I.C.C. shipping containers.

(b) Motion picture film should never be allowed in any underground subway train or station unless under the jurisdiction of the Interstate Commerce Commission and conforming to the regulations thereof.

Section 19—Motion Picture Projection and Special Processes

191. Enclosures for Motion Picture Projectors.—(a) Motion picture projectors using nitrocellulose film shall be operated or set up for operation only within an approved enclosure, not less than 48 square feet in size and 7 feet high. If more than one machine is to be operated an additional 24 square feet shall be provided for each additional machine.

For new construction, a size not less than 8 feet wide, 10 feet deep and 8 feet high is recommended for one projection machine, and not less than 14 feet wide, 10 feet deep and 8 feet high for two machines.

(b) The walls and ceiling of the enclosure shall be built of brick, tile, or plaster blocks, plastered on both sides, or of concrete, or of a rigid metal frame, properly braced, and sheathed and roofed with sheet iron of not less than No. 20 U.S. gauge metal, or with ¼-inch hard asbestos board, securely riveted or bolted to the frame, or 2 inches of solid metal lath and cement or gypsum plaster. All joints shall be sufficiently tight to prevent the discharge of smoke. Noncombustible acoustical material may be used on ceiling and walls, on top of the plaster.

For new construction, it is recommended that the walls of the enclosure be constructed in accordance with the requirements of subsection 112, paragraphs (1), (2), or (3), for partitions with floor and ceiling of equivalent fire resistance. Modern heavy equipment may require special attention to floor strength and support. In some cases it may be necessary to support the projection room independently of the structure.

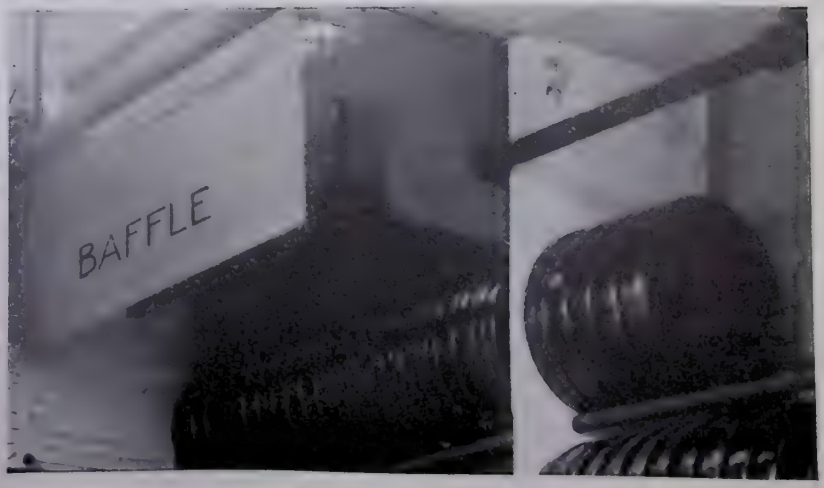
(c) The entrance door into the enclosure shall be at least 2 feet by 5 feet, of construction equivalent to the sheathing permitted above for rigid frame construction, and shall be self closing, swinging out, and shall be kept closed at all times when not used for egress or ingress.

For new construction it is recommended that at least two doors be provided, each not less than 30 inches wide and 6 feet high. Doors should be approved fire doors of a type suitable for use in corridor and room partitions (Class C openings as defined in the Regulations on Protection of Openings in Walls and Partitions). Exits should be in accordance with requirements of authorities having jurisdiction, particularly as to size and location. At least one should be of the conventional stairway type, having a suitable landing at the top or should open directly onto a corridor.

(d) Two openings for each motion picture projector shall be provided; one for the projectionist's view (observation port) shall be not larger than 200 square inches, and the other through which the picture is projected (projection port) shall be not larger than 120 square inches. Where separate stereopticon, spot or flood light machines are installed in the same enclosure with picture machines, not more than one opening for each such machine shall be provided for both the operator's view and for the projection of the light, but two or more machines may be operated through the same opening; such openings shall be as small as practicable and shall be capable of being protected by approved automatic shutters.

(e) Each opening shall be provided with an approved gravity shutter set into guides not less than one inch at sides and bottom, and overlapping the top of the opening by not less than one inch when closed. Shutters shall be of not less than 10-gauge iron or its equivalent, or of ¼-inch hard asbestos board.

VIEW OF THE BAFFLE and partition, in connection with sprinklers. The sprinkler heads are separated by sheet-metal baffles extending below the sprinkler deflectors. When an approved automatic sprinkler system with open heads is permitted, the baffles between heads may be omitted. In the 750-cubic-foot vault, there are 12 sprinkler heads, arranged to give uniform distribution within the sections formed by the prescribed partitions in vaults.



Guides shall be of not less than 10-gauge iron or its equivalent. Shutters shall be suspended, arranged and interconnected so that all openings will close upon the operating of some suitable fusible or mechanical releasing device, designed to operate automatically in case of fire or other contingency requiring the immediate and complete isolation of the contents of the enclosure from other portions of the building. Each shutter shall have a fusible link above it, and there shall also be one located over each upper projector magazine which, upon operating, will close all the shutters. There shall also be provided suitable means for manually closing all shutters simultaneously from any projector head and from a point within the projection room near each exit door. Shutters on openings not in use shall be kept closed.

(f) All shelves, furniture and fixtures within the enclosure shall be constructed of incombustible material. Tables shall conform to paragraph 117. No combustible material of any sort whatever shall be permitted or allowed to be within such enclosure, except the films used in the operation of the machine, and film cement. See Section 214.

(g) Ventilation shall be provided by one or more mechanical exhaust systems which shall draw air from each arc lamp housing and from one or more points near the ceiling. Systems shall exhaust to outdoors either directly or through a non-combustible flue used for no other purpose. Exhaust capacity shall be not less than 15 nor more than 50 cubic feet per minute for each arc lamp plus 200 cubic feet per minute for the room itself. Systems shall be controlled from within the enclosure and have pilot lights to indicate operation. The exhaust system serving the projection room may be extended to cover rooms associated therewith such as rewind rooms. No dampers shall be installed in such exhaust systems. Ventilation of these rooms shall not be connected in any way with ventilating or air conditioning systems serving other portions of the building.

(h) Exhaust ducts shall be of non-combustible material, and shall either be kept one inch from combustible material or covered with ½-inch of non-combustible heat insulating material.

(i) Fresh air intakes other than those direct to the open air shall be protected by approved fire shutters arranged to operate automatically with the port shutters.

(j) Provision shall be made so that the auditorium lights can be turned on from inside the projection room and from at least one other convenient point in the building.

NOTE—Automatic sprinklers in projection rooms have been very successful in controlling fires and reducing losses, and their installation is recommended wherever practicable.

193. Processing of Film.—The processing of film, as cleaning, polishing, buffing and other special treatments, shall not be done in rooms where other operations are performed, except that in motion picture theatres, cleaning of film may be done in the rewind room (See paragraph 212). Special processes for treating film shall be provided with such proper safeguards as are necessary for protection against the hazards involved. The inspection department having jurisdiction shall be consulted in regard to the protection needed.

194. Soldering Cases. — Soldering cases of film when done in a building shall be conducted in a room used for no other purpose. Walls of the room shall be constructed of 6 inches hollow tile plastered each side to a thickness of ½ inch or its equivalent. Area of room shall not exceed 60 square feet. Opening to room shall not be from another film handling room; it shall be protected by an approved self-closing Class B fire door. Automatic vent shall be provided with a ratio of 70 square inches for each 500 pounds of film. Room shall be equipped with automatic sprinklers with a ratio of one sprinkler for each 15 square feet with proper sheet metal baffles. Quantity of film in room shall not exceed one case.

NOTE—The use of shipping cases with metal linings of the telescope type which do not need to be soldered is recommended.

195. Silver Reclaiming.—The process of reclaiming silver from film shall not be carried on in a building with other processes unless cut off therefrom by standard fire walls. Such sections shall be completely equipped with automatic sprinklers.

195. Film Cement.—Compounds of collodion, amyl acetate or similarly flammable cements shall not be kept in the rooms where they are used, in quantities greater than 1 quart; and such material in excess of this quantity shall be kept in a vault. The use of these materials in motion picture thatres and other special occupancies is covered in sub-section 214.

197. Smoking. — Smoking, except in rooms especially provided for the purpose, should be prohibited in any establishment handling or storing film, and conspicuous "No Smoking" signs should be posted in prominent places. Matches should not be carried by any employe.

PART II: SPECIAL PROVISIONS FOR SPECIAL OCCURRENCES

NOTE—It is the intent of the regulations to permit the use of 2,000-foot rolls of 35 mm. film in theatres and exchanges only, when handled and stored as prescribed. The limitations on quantities permitted are based on weight.

Section 21—Motion Picture Theatres and Other Occupancies in which the Principal Use of Film Is in Motion Picture Projection

211. Enclosure for Projectors.—Motion picture projectors shall be installed in an enclosure in accordance with subsection 191.

212. Rewinding. — (a) Rewinding of films shall be performed either in a special rewind room at an approved location, or in the projection room. If done in the projection room, approved enclosed-type rewind machines should be used. An approved can for scrap film having a self-closing hinged cover shall be provided.

(b) Rewind rooms shall be at least 80 square feet in area, with walls and doors in accordance with the requirements of subsection 112 and with ceiling of equivalent fire resistance, and shall have a vent to the outside of the building of not less than 27 square inches (see paragraph 191(g)). Exhaust ducts shall comply with paragraph 191 (h). Shelves, furniture and fixtures shall comply with paragraph 191 (f).

213. Care and Use of Film.—Motion picture film used in connection with the projection of motion pictures (as in theatres, motion picture theatres, screening or projection rooms, sound recording studios, and motion picture titling studios) shall be limited and kept as follows:

(a) The quantity of film in any projection room or rewinding room not equipped with an approved system of automatic sprinklers shall be limited to that given below: if equipped with an approved system of automatic sprinklers, double the quantity specified may be permitted.

(1) In a projection room, constructed of brick, hollow tile, concrete or other approved masonry, not exceeding 125 pounds (25,000 feet of 35 mm. film);

(2) In a rewinding room constructed of brick, hollow tile, concrete, or other approved masonry, separated from projection room with openings thereto protected with approved fire doors, not exceeding 125 pounds (25,000 feet of 35 mm. film);

(3) In a projection booth constructed of metal frame covered with asbestos board or sheet iron, not exceeding 75 pounds (15,000 feet or 35 mm. film);

(4) In a special room constructed and vented as required for rewinding rooms (see sub-section 212), when approved by the inspection department having jurisdiction, not exceeding 125 pounds may be kept in lieu of the amount permitted in either the projection room or the rewind room. The total quantity in the three rooms shall not exceed 250 pounds (50,000 feet of 35 mm. film).

(b) The above quantities of film shall be kept as follows:

(1) Up to 40 pounds (8,000 feet of 35 mm. film) of film may be kept in Interstate Commerce Commission shipping containers, or approved cabinet in each room;

(2) If the amount of film on hand exceeds 40 pounds, an approved cabinet shall be provided, in which the amount of film in excess of 40 pounds shall be kept.

214. No collodion, amyl acetate or other similar flammable cement or liquid in quantities greater than 1 pint shall be kept in the projection booth or room or rewind room.

215. Splices in film shall be made on mechanical cutting and splicing machines. See paragraph 212(a) on handling of scrap film.

216. Location.—The number and location of motion picture projection rooms or booths in any non-sprinklered building shall be subject to the approval of the inspection department having jurisdiction.

217. Operation.—Motion picture projectors shall be operated by and be in charge of qualified projectionists, who shall not be minors.

218. Procedure in Case of Fire.—In the event of film fire in a projector or elsewhere in a projection or rewind room, the projectionist should immediately

shut down the projection machine and arc lamps, operate the shutter release at the nearest point to him, turn on the auditorium lights, leave the projection room, and notify the manager of the theatre or building.

Section 22—Motion Picture Film Exchanges

(See Part I General Provisions which also apply)

221. **Sprinkler Protection.**—Buildings not of fireproof construction, housing an exchange, shall be completely equipped with automatic sprinklers. Buildings of fireproof construction shall be equipped from and including the lowest floor on which film is handled to the top of the building with an approved automatic sprinkler system. It is recommended that the sprinkler system extend throughout the building.

222. Exchanges shall be provided with one or more independent rooms to be used exclusively for receiving and delivering film, and also one or more separate rooms for the purpose of inspecting, examining and repairing film, and one or more rooms for the storage of posters or other combustible materials.

223. **Shipping Room.**—One or more vaults or cabinets shall be provided in connection with the receiving and shipping room of exchanges into which all film shall be placed and kept except during such time as is necessary for checking, sorting and shipping. All film outside the vaults and cabinets, except while actually being handled, shall be kept in I.C.C. containers.

NOTE—With the enforcement of the above general principles of operation, the total quantity of film, including that which is in I.C.C. containers, in the receiving and shipping room of any exchange should ordinarily not exceed 100 to 150 standard rolls or 50 to 75 double rolls, with a maximum limit, which should never be exceeded, of 300 standard rolls or 150 double rolls or 1,500 pounds.

224. **Quantity of Film.**—In inspection, projection, rewinding and other rooms (not including shipping room) there shall not be in excess of 16 standard rolls or 8 double rolls for each person handling film in such rooms, of which not in excess of 2 standard rolls or one double roll for each person shall be exposed outside of closed containers. All film in excess of this quantity shall be kept in cabinets or vaults.

Section 23—Motion Picture Film Laboratories

(See Part I General Provisions which also apply)

231. All buildings used for, or housing a motion picture film laboratory shall be equipped throughout with automatic sprinklers.

232. **Quantity of film.**—In all the various work rooms in which film is handled (not including shipping rooms) the quantity of film not in containers shall not exceed two standard rolls per person handling film; this should not be construed, however, as restricting the quantity of film which may be in process on printing, developing or drying machines to two standard rolls. There shall not be more than 10 standard rolls of film not in approved cabinets for each person working in such rooms; provided, however, that in developing rooms there shall not be more than 20 standard rolls of film not in approved cabinets for each developing unit. All film in excess of the above quantities shall be kept in cabinets or vaults.

233. **Printing.**—On all future installations, unless printing machines are so spaced that the distance from the film on any machine to that on any other machine is at least six feet, they shall be separated from each other by incombustible partitions of ¾-inch hard asbestos board or its equivalent in heat insulation and durability, and extending from the floor to at least 3 feet above the top of the film on the machines. If partitions carried to this height would extend higher than 2 feet below sprinkler deflectors, they shall be built up to the ceiling. If partitions are extended to the ceiling one sprinkler head shall be located in each of the sections thus formed. In any event, sprinklers shall be so arranged that not more than two machines are dependent upon the protection afforded by any one head.

234. **Drying.**—Drying machines of the cabinet type shall be of metal and wired glass. Heating units shall be located outside the cabinet, and shall be provided with thermostatic control so that the temperature in the cabinet shall not exceed 120° F.

235. **Waxing.**—Waxing film shall be done in a separate room. Waxing processes which require the waxed film to be left exposed to dry shall be in a room used for no other purpose and not over 5 such machines shall be located in one room. Not over 25 standard rolls or 25,000 feet of film shall be exposed at one time.

236. **Projectors.**—Not more than 5 motion picture projectors shall be located in one room, unless the projectors are of a type using incandescent electric lights of not over 25 watt size when not more than 10 projectors shall be located in one room.

237. **Shipping Room.**—(a) The shipping room shall be separated from the rest of the building by partitions constructed in accordance with the provisions of sub-section 112. No other process than packing of film shall be conducted in the shipping room.

(b) Not over 500 standard rolls of film shall be in a shipping room at one time of which the quantity not in shipping cases shall not exceed 250 standard rolls. See sub-section 181.

Section 24—Motion Picture Studios

(See Part I General Provisions which also apply)

241. Buildings housing motion picture studios shall be completely equipped with automatic sprinklers, except that upon specific approval of the inspection department having jurisdiction, sprinklers may be omitted in rooms of a construction having a fire retardant classification of not less than one hour and used only for housing valuable electrical equipment and in which no film or other hazardous materials are handled or stored.

NOTE—For sound recording studios and motion picture titling studios see Section 21.

242. (a) On the studio stage there shall be no film except in the magazines of cameras or sound recording apparatus of which there shall not exceed two magazine units for each camera or recording apparatus.

In other sections of a motion picture studio the quantity of film not in containers shall not exceed one standard roll per person handling such film.

(b) Extra, loaded magazines may be kept in a special magazine room. The number of loaded magazines in one such room shall not exceed 50. They shall be kept on open metal racks. Such rooms shall be used for the loading and storing of magazines only.

(c) In all sections of a motion picture studio other than the stage and magazine rooms, the quantity of film in a room shall not exceed 10 standard rolls per person in handling film, in addition to what may be kept in cabinets.

(d) All film in excess of the quantities permitted above shall be kept in cabinets or vaults.

243. Vaults and/or cabinets shall be located in a section separated from the studio stage by partitions. (See subsection 112.)

244. Sections of a studio in which the work is of the same general character as that in a laboratory shall be governed by the provisions of Section 23 Laboratories.

245. (a) Carpenter shops, property storage rooms, costume rooms and dressing rooms shall be separated from the studio stage by fire partitions constructed of 8 inches of brick, or of some other construction of incombustible materials and suitable stability, having a fire retardant classification of not less than 2 hours as determined by the Standard Fire Test.

(b) Only such openings as are necessary shall be provided in such fire partitions and shall be protected by approved fire doors of a type suitable for use in Class B situations as defined in the Regulations for the Protection of Openings in Walls and Partitions Against Fire; openings of larger than standard size may be provided when necessary if protected by approved oversize fire doors.

246. Materials constituting a permanent finish or interior surfacing on ceilings, permanent partitions and walls, and used to reduce the reflection or transmission of sound, shall, if not incombustible, be or treated so as to be of an approved slow burning composition or character.

247. All fabrics of monk's cloth, canvas, muslin, burlap, silk, satin, velvet, velour or similar material suspended from ceilings or gridirons or hanging against walls or partitions, and all back drops, cycloramas and other theatrical appurtenances constructed in whole or in part of muslin, canvas, burlap, and all artificial or natural trees, shrubbery, grass mats, straw, hay and similar combustible material shall be painted, sprayed or saturated with fire retarding or flame proofing material or otherwise rendered safe against fire; provided, however, that furnishings of silk, satin, velvet and velour which are used in sets and included in the photographing of scenes need not be so treated.

Germicidal Fixtures for Air Disinfection

Selection, Installation, and Operation Of Ultraviolet Lamps for Air Sanitizing

DR. L. J. BUTTOLPH
Engineer of the Nela Park Engineering Division, General Electric Company

As the ultraviolet from the sun and sunlamps will tan the skin and darken the photographic film, so will the shorter wave ultraviolet energy from artificial sources kill air-borne bacteria, viruses and fungi. Intensity and time make up the exposure producing these effects, and ultraviolet intense enough to kill germs quickly will also affect the face and eyes. For this reason lamps and equipment for air disinfection must be selected, installed and operated with much more care than is necessary for artificial illumination.

USE OF FIXTURED LAMPS

Air can be disinfected of bacteria, viruses and fungi by using ultraviolet germical lamps in any of three ways: (1) on the side walls or ceiling of a room to irradiate the air above the 7-foot level, and sometimes on the side walls to also irradiate the floors and the air below the 30-inch level; (2) in an air duct to irradiate the air passing through it; (3) and in a room to irradiate all the air in it from fixtures mounted on the ceiling or side walls, and sometimes provided with baffles to restrict the ultraviolet to germicidal curtains or barriers. Air above the head level, or in air circulating ducts, disinfected by germicidal ultraviolet is in turn, as good as outdoor air for room air disinfection by ventilating dilution as will be detailed later.

Choice of Fixtures

Fixtures for side wall and ceiling use should be carefully selected for safety, effectiveness and convenience. To examine a fixture for its safety put a germicidal or corresponding fluorescent lamp in it and place it as if inverted on a wall one foot below eye level. If you use a germicidal lamp tube for this or the following fixture examination be sure to wear goggles lest you burn your eyes, and do not expose your face any longer nor nearer to the lamp than necessary. A piece of cellophane or glass will protect the face.

Neither the lamp tube nor any reflected image of it should be visible at distances out to 10 feet. At 10 feet, and at the level of the lamp, not more than one quarter of the tube diameter should be visible either directly or in the reflector. This insures that there will not be face or eye irritation, because of the fixture, when it is properly mounted on a room wall at 6½ to 7 feet from the floor.

To examine a fixture for its effectiveness put a lamp in it and place it, as if mounted normally on a wall or ceiling, but on a table, a chair, a box or the floor so that it is at exactly the distance below eye level it might be mounted below a ceiling. Look at the fixture through suitable goggles from the various distances and directions possible in the room where it may be installed. You can get a good idea of how completely it will irradiate the upper air of a room by looking at it this way, as if from various places on the room ceiling. Pay special attention to the appearance of the reflector, which should have a highly polished surface of mirror quality either of aluminum or of chromium plate. An unpolished aluminum reflector, if visible when installed, will scatter ultraviolet downward to produce face and eye irritation. This is of special importance in the types of fixtures having an extended reflecting surface visible back of and above the germicidal lamp. Looked at as if from the ceiling, the reflector should be nearly full of reflected light from the lamp and the tube itself should be almost entirely visible from the opposite side of the room at eye (ceiling) level. A fixture should be considered ineffective at distances beyond which the lamp is not at least half visible and the reflector well filled with light.

Look down at the fixture from directly above and note that light either from the exposed lamp tube or the lower part of the reflector is of relatively little value in that direction and distance compared with the distance and direction across the room, and keep in mind also that ultraviolet which goes up and back to the wall at close range may fade or discolor some wall finishes in a short time.

While the amount of ultraviolet leaving a fixture is important, its direction of greatest intensity is still more so, especially under low ceilings. The more nearly horizontal this direction of greatest intensity the farther the ultraviolet can travel before being absorbed in the ceiling and the larger the room practical to irradiate solely from the side walls without the use of fixtures mounted on the ceiling or columns, or the greater the square feet of ceiling and cubic feet of upper air per fixture.

In examining a fixture for its convenience remember that it and the germicidal lamp in it must be cleaned frequently and the lamp replaced once or twice a year. Note whether there is hand or automatic starting and if a "no blink" starter is used. Note the provision, if any, for turning the lamp on and off. For large installations, note whether a high power-factor ballast is used, and for permanent installation note the provision for electrical connections to an outlet box.

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Installation Appraisal

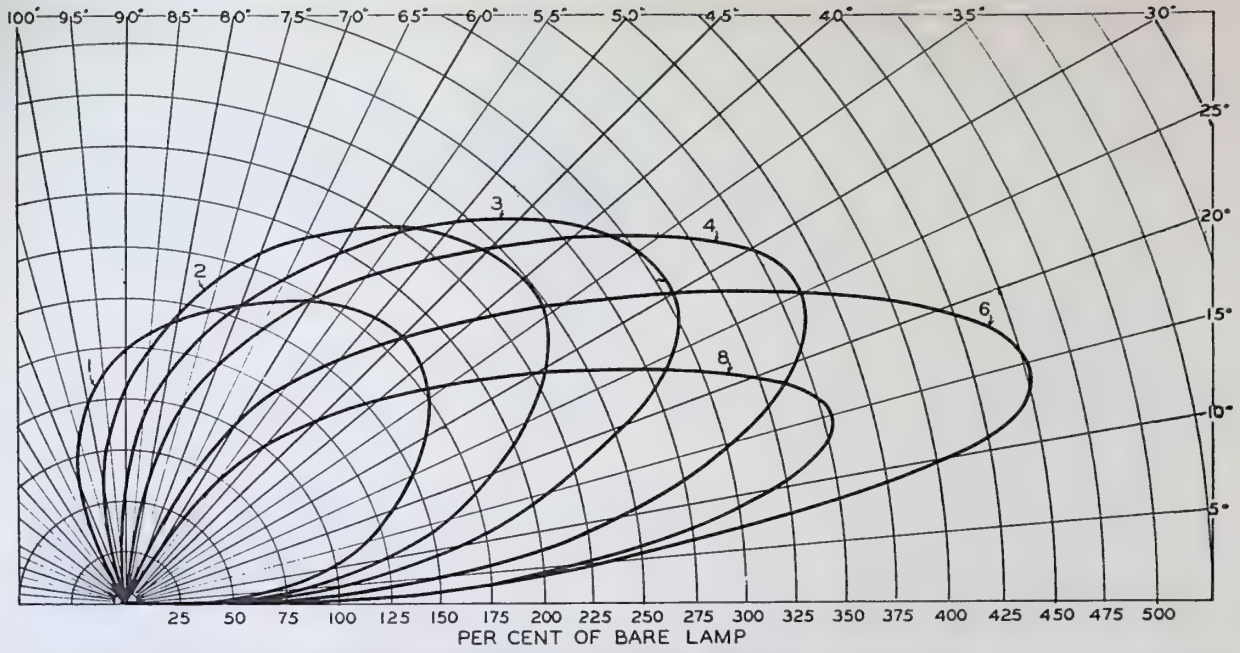
The number of fixtures needed in a room depends upon its length, width and height, and upon the amount and direction of the ultraviolet from the fixtures to be used. This ultraviolet amount and direction cannot be determined by the above visual inspection, and the accurate calculation of various room requirements can only be done by a rather complicated method described elsewhere. Reputable manufacturers should publish distribution curves on their fixtures and corresponding tables of the lamp requirements of various rooms. If only distribution curves are available or are obtained by the proper measurements they may be compared with the following family of typical distribution curves, actually superposing them by transferring the data, if necessary, to find the approximate type and from it the lamp requirements of various rooms in the following tables. These typical curves do not cover all the design possibilities, and tables for unusual distribution characteristics will be supplied upon submission of fixtures or authentic distribution data to the Lamp Department, General Electric Company, Nela Park Engineering Division.

Quality of Lamps

It is important to note here that no one fixture type can be said to be better than others for all purposes. Each type may be of special value for certain uses and a complete appraisal of a fixture must take into account not only the effectiveness but also the size, appearance and cost. The highest efficiency is, for example, and as usual, obtainable only at additional cost and by a sacrifice of other qualities.

Number of Fixtures

In the Fixture Type Tables shown herein are specified the numbers of fixtures using 15- or 30-watt General Electric germicidal lamps and needed for normal installation in rooms of various ceiling heights and sizes, where the room length exceeds the width by less than 50 per cent. There is no increase in the number of fixtures required for fixture to ceiling distances greater than those listed. Those long rooms where the length exceeds the width by more than 50 per cent, or rooms of an average dimension greater than is listed in the



DISTRIBUTION CURVES OF ULTRAVIOLET ENERGY should be available from all fixture manufacturers, so that the installation can be efficiently accomplished. While the amount of ultraviolet leaving a fixture is important, its direction of greatest intensity is still more so. The more nearly horizontal this direction of greatest intensity the farther the ultraviolet can travel before being absorbed in the ceiling and the larger the room practical to irradiate solely from the side walls without the use of fixtures mounted on the ceiling or columns, or the greater the square feet of ceiling and cubic feet of air to be treated from a single fixture.

tables, should be treated as two rooms. The stepped diagonal lines up across the tables indicate that fixtures to the right and below, under low ceilings and in the larger rooms, should be mounted on columns or suspended from the ceiling, as well as on the side walls, to secure as uniform irradiation of the upper air as possible. The black face type indicates installations good for rooms occupied by children and adults for 8 hours per day but of too high an intensity for infants or for continuous use by adults. The light face italic type indicates installations good for hospital and nursery use where infants may continually receive ultraviolet reflected down from the ceiling. It may sometimes be necessary to compromise on one half as many fixtures as would be required for a 99 per cent disinfection, for about a 90 per cent upper air disinfection, in low ceiling hospital nurseries; or one quarter as many for a 70 per cent disinfection; or even one eighth as many for a 45 per cent disinfection, of value in some places; as is shown in the last three lines of the tables.

The above instructions and suggestions apply to nearly all germicidal installations such as may be made in hospital wards, schools, and general offices where the amount of respiratory infection, the crowding or a lack of ventilation calls for the maximum practical air disinfection by the upper air method. Large rooms and those whose length exceeds the width by more than 50 per cent should be treated as a group of small rooms, for example, a 45 by 110-foot area should be treated as three 45 by 35-foot areas each with an average dimension of 40 feet. There should be liberal allowance for ceiling obstructions such as ducts, beams and columns, which have the effect of decreasing the effective distance from the fixture to the ceiling.

Under separate subtitles following the explanation of lower air disinfection by upper air irradiation will be found suggestions as to special cases needing more or fewer than the number of germicidal fixtures specified above, or needing types of fixtures different from those described as Types 1, 2, 3, 4, 6 and 8.

Special Cases

The humidity of spring weather and the tropics may render a germicidal installation so relatively ineffective as to necessitate special attention to the natural ventilation especially during spring weather when, in the case of schoolrooms for example, childhood diseases are still prevalent, the air heating and convection circulation is at a minimum and windows are still kept closed.

Words of Caution

Never specify or install General Electric germicidal lamps in hospital, school or nursery rooms unless you know about the ceiling. An unpainted "white-coat" plaster must first be painted with an oil base paint and the reflectivity of already painted ceilings should be measured by a competent person with an ultraviolet reflectivity meter.

The reason for irradiating only the upper (above 6½-7 feet) air of a room is to keep the ultraviolet away from the face and eyes. This purpose is defeated by ultraviolet reflection downward from the ceiling. The following tables assume ceiling reflectivities of 6 to 10 per cent but an unpainted "white-coat" plaster ceiling such as is often found in new schools and hospitals may reflect 40-50 per cent of the germicidal ultraviolet and the recently available flat white casein or glue base paints containing materials similar to plaster, such as calcium sulphate or magnesium carbonate, may have as high a reflectivity.

While the effect of a highly reflective ceiling may be reduced by the choice of a low angle fixture, such as the Type 6, painting or sizing is usually the only safe solution. Note that little can be done by using fewer fixtures as one half as many reduces the upper air disinfection from 99 to 90 per cent and the reflected ultraviolet only in a ratio of 2 to 1 when a reduction of 6 to 1 (30-50 per cent to 5-10 per cent) in reflected ultraviolet may be necessary.

Fixtures designed for hospital use with an opening in the reflector below the germicidal lamp to provide a downward curtain or screen or barrier of ultra-violet across door openings and the front of hospital cubicles should not be installed in nurseries or schools or where infants or children may expose their eyes and faces for indefinite periods to the direct radiation from the bare lamp.

Mounting Suggestions

While each fixture must be attached to the wall or ceiling in the ways suggested by the manufacturer they should be kept away from room corners a distance at least double that to the ceiling. Ceiling or column mounted fixtures should be as low as possible, usually one foot higher than is practical on the side walls.

Fixtures should be distributed on the side walls and ceiling to provide as uniform upper air irradiation as possible, remembering that the individual units are effective over an oval or rectangular area of a width out from the fixture one

Type 1	Fixture to Ceiling—Feet	% Upper Air Disinfection	Average Room Dimension	12–17		18–23		24–29		30–35		36–41		42–47	
			Germicidal Lamp Sizes	15w	30w	15w	30w	15w	30w	15w	30w	15w	30w	15w	30w
	30	99		—	—	—	—	—	—	3	1	5	2	7	3
	20	99		—	—	—	—	3	1	4	2	6	2	9	3
	15	99		—	—	3	1	4	2	5	2	7	3	11	4
	10	99		3	1	4	2	6	3	7	3	9	4	13	5
	9	99		3	1	5	2	6	3	8	3	10	4	15	6
	8	99		3	1	5	2	7	3	9	4	12	5	17	7
	7	99		4	2	6	3	8	3	9	4	13	5	19	8
	6	99		4	2	7	3	9	4	10	4	15	6	21	9
	5	99		5	2	7	3	10	4	12	5	17	7	24	10
	4	99		6	3	9	4	11	4	14	6	19	8	28	11
	3	99		7	3	11	5	14	6	18	7	25	10	36	14
	2	90		5	—	7	—	10	—	12	—	17	—	26	—
	1	70		5	—	7	—	10	—	12	—	17	—	26	—
	1	45		2	—	3	—	5	—	6	—	9	—	13	—

Type 2	Fixture to Ceiling—Feet	% Upper Air Disinfection	Average Room Dimension	12–17		18–23		24–29		30–35		36–41		42–47	
			Germicidal Lamp Sizes	15w	30w	15w	30w	15w	30w	15w	30w	15w	30w	15w	30w
	30	99		—	—	—	—	—	—	3	1	4	2	6	3
	20	99		—	—	—	—	3	1	3	1	5	2	7	3
	15	99		—	—	2	1	3	1	4	2	6	3	9	4
	10	99		3	1	3	1	5	2	5	2	7	3	10	4
	9	99		3	1	3	1	5	2	6	2	8	3	12	4
	8	99		3	1	4	2	5	2	7	3	9	4	13	5
	7	99		3	1	4	2	6	3	7	3	10	4	14	6
	6	99		4	2	5	2	6	3	8	3	11	4	16	7
	5	99		4	2	6	3	8	3	10	4	13	5	19	8
	4	99		5	2	9	3	10	4	12	5	16	6	23	9
	3	99		6	3	9	4	13	5	15	6	20	8	29	11
	2	90		4	—	6	—	9	—	10	—	13	—	19	—
	1	70		4	—	6	—	9	—	10	—	13	—	19	—
	1	45		2	—	3	—	4	—	5	—	7	—	9	—

Type 3	Fixture to Ceiling—Feet	% Upper Air Disinfection	Average Room Dimension	12–17		18–23		24–29		30–35		36–41		42–47	
			Germicidal Lamp Sizes	15w	30w	15w	30w	15w	30w	15w	30w	15w	30w	15w	30w
	30	99		—	—	—	—	—	—	3	1	4	2	6	3
	20	99		—	—	—	—	3	1	3	1	4	2	6	3
	15	99		—	—	2	1	3	1	4	2	5	2	7	3
	10	99		2	1	3	1	4	2	5	2	6	3	9	4
	9	99		2	1	3	1	4	2	5	2	7	3	10	4
	8	99		3	1	4	2	5	2	6	2	8	3	11	4
	7	99		3	1	4	2	5	2	6	2	8	3	12	5
	6	99		3	1	4	2	5	2	7	3	9	4	13	5
	5	99		3	1	5	2	7	3	8	3	11	4	16	6
	4	99		4	2	6	3	8	3	10	4	13	5	19	8
	3	99		5	2	7	3	10	4	13	5	17	7	25	10
	2	90		4	—	5	—	7	—	9	—	12	—	18	—
	1	70		4	—	5	—	7	—	9	—	12	—	18	—
	1	45		2	—	2	—	3	—	4	—	6	—	9	—

Type 4	Fixture to Ceiling—Feet	% Upper Air Disinfection	Average Room Dimension	12–17		18–23		24–29		30–35		36–41		42–47	
			Germicidal Lamp Sizes	15w	30w	15w	30w	15w	30w	15w	30w	15w	30w	15w	30w
	30	99		—	—	—	—	—	—	3	1	4	2	6	3
	20	99		—	—	—	—	2	1	3	1	4	2	6	3
	15	99		—	—	2	1	3	1	3	1	5	2	7	3
	10	99		2	1	3	1	3	1	4	2	5	2	7	3
	9	99		2	1	3	1	4	2	5	2	6	2	9	4
	8	99		2	1	3	1	4	2	5	2	7	3	10	4
	7	99		2	1	3	1	4	2	5	2	7	3	10	4
	6	99		3	1	5	2	5	2	6	3	8	3	12	5
	5	99		3	1	4	2	6	3	7	3	9	4	13	5
	4	99		3	1	5	2	6	3	8	3	11	4	16	6
	3	99		4	2	6	3	8	3	10	4	13	5	19	8
	2	90		3	—	5	—	6	—	8	—	12	—	18	—
	1	70		3	—	5	—	6	—	8	—	12	—	18	—
	1	45		1	—	2	—	3	—	4	—	6	—	9	—

Type 6	Fixture to Ceiling—Feet	% Upper Air Disinfection	Average Room Dimension	12–17		18–23		24–29		30–35		36–41		42–47	
			Germicidal Lamp Sizes	15w	30w	15w	30w	15w	30w	15w	30w	15w	30w	15w	30w
	9	99		—	—	—	—	—	—	5	2	7	3	10	4
	8	99		—	—	—	—	4	2	5	2	7	3	10	4
	7	99		—	—	3	1	4	2	5	2	7	3	11	4
	6	99		2	1	4	2	5	2	6	3	8	3	12	5
	5	99		3	1	4	2	5	2	7	3	9	4	13	5
	4	99		3	1	5	2	6	3	8	3	11	4	16	6
	3	99		4	2	6	3	8	3	10	4	13	5	19	8
	2	90		2	—	4	—	5	—	7	—	9	—	13	—
	1	70		2	—	4	—	5	—	7	—	9	—	13	—
	1	45		1	—	2	—	2	—	3	—	5	—	6	—

Type 8	Fixture to Ceiling—Feet	% Upper Air Disinfection	Average Room Dimension	12–17		18–23		24–29		30–35		36–41		42–47	
			Germicidal Lamp Sizes	15w	30w	15w	30w	15w	30w	15w	30w	15w	30w	15w	30w
	9	99		—	—	—	—	—	—	6	2	8	3	11	4
	8	99		—	—	—	—	5	2	6	2	8	3	12	4
	7	99		—	—	4	2	5	2	6	2	8	3	12	4
	6	99		2	1	5	2	6	2	7	3	9	4	13	5
	5	99		3	1	5	2	6	3	8	3	11	4	16	6
	4	99		3	1	6	2	7	3	9	3	12	5	18	8
	3	99		4	2	6	3	9	4	11	4	15	6	22	10
	2	90		2	—	4	—	5	—	8	—	11	—	16	—
	1	70		2	—	6	—	5	—	8	—	11	—	16	—
	1	45		1	—	2	—	2	—	3	—	6	—	8	—

THESE FIXTURE TYPE TABLES show the number of 15- or 30-watt germicidal lamps needed for normal installation in rooms. The "Average Room Dimension" is one-half the length plus the width. Black type indicates installations for rooms occupied by children and adults for 8 hours a day. The stepped diagonal lines indicate that fixtures to the right, and below, under low ceilings and larger rooms, should also be mounted on columns or suspended.

half to two thirds the length of the area, depending upon the type of fixture and the fixture to ceiling distance. This means that even in a small room two 15-watt units on opposite walls are better than a single 30-watt and that in rooms of a length double the width two fixtures should always be used, centered on the end walls. In large rooms where some or all of the fixtures are ceiling or column mounted the same general principles apply. Often standard side wall fixtures may be assembled back-to-back for such ceiling or column use. In corner rooms where two units must be placed on adjacent walls they should be about two thirds the wall widths away from the common corner.

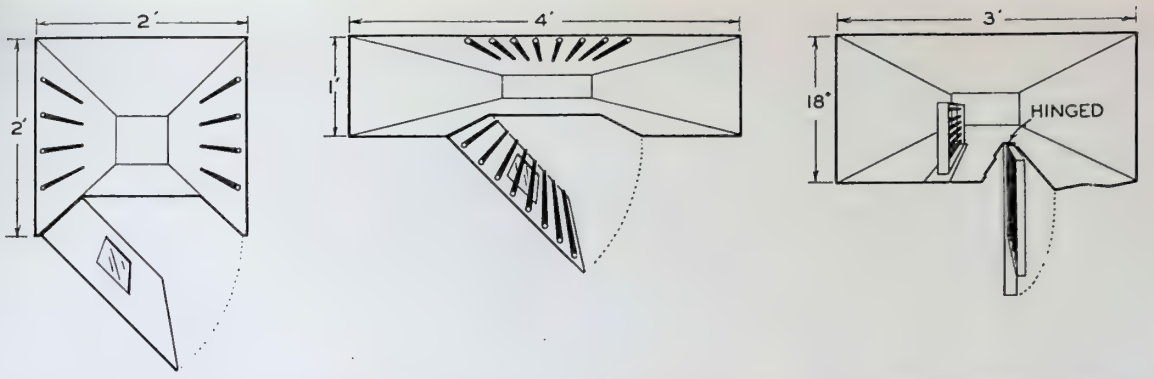
Operational Details

During the first 100 hours of operation some germicidal lamps produce noticeable amounts of ozone, how noticeable depending upon the humidity of the air and the amount of ordinary ventilation in the room. Excessive ozone is nearly always an indication of inadequite ventilation by any standards of comfort and health. In any case the ozone-producing quality of such lamps is reduced to less than half during the first few days of use and most of this reduction can be secured by operating a new installation for about 24 hours while the room is unoccupied. In cases of persistent ozone look to the ventilation.

General Electric germicidal lamps are rated at their output after 100 hours operation but the fixture recommendations in this guide are based on the average output through life rather than the 100-hour rating. Group replacement at intervals of three fourths the rated life is recommended for industrial and some institutional installations, an alternative method is individual replacement of all lamps that depreciate below 70 per cent of the 100-hour rating, as indicated by simple available germicidal output meters.

Maintenance of a germicidal installation should be on a much more definite and arbitrary basis than is usual with lighting installations because the user has no visible indication of the ultraviolet output of the germicidal lamp nor any direct evidence of air disinfection. Lamps and fixtures should be cleaned every two to four weeks depending upon local conditions, and in some places every week. While special aluminum and chromium cleaning materials are best for the reflectors most any of the usual glass cleaning compounds may be used on the germicidal tube and reflector so long as no materials containing oils or waxes are used. Cleaning powders that do not scratch are very good.

Germicidal lamps should be operated continuously all the time people are in the room but they serve little purpose before or 15 minutes after such periods. Any installation which will disinfect the air of a room as rapidly as it is contaminated by the people in it will clean up any residual contamination very quickly indeed as soon as the room is vacated. Continuous operation is usual



HANDLING INSTALLATION IN SMALL-SIZE DUCTS is shown there, at the left a 2x2-foot in the center a 1x4-foot, and at the right a 1½x3-foot duct. In the text will be found the details for determining the proper number of germicidal lamps to be installed in such ducts. Here are seen three ways of installing the lamps in relation to service doors. At left, the service man reaches into the duct for both sides of the installation. In the center, part of the installation is made on the door, necessitating reaching into the duct for only half the lamps. At the right, the lamps are installed on hinged frames which can be swung into position after inspections.

in hospitals, time switches or entirely centralized controls are recommended in schools, and any switching method independent of individual whims may be used in offices and industrial installations. Germicidal lamps should be on circuits entirely independent of the lighting circuits.

Upper-Air Irradiation

Such installations of General Electric germicidal lamps as are specified in the previous tables will provide an air disinfection calculated as 99 per cent at usual rates of air circulation through the space above a 7-foot level, down to 90 per cent for one half as many fixtures, 70 per cent for one quarter as many, and 45 per cent for one eighth of the 99 per cent requirement. The circulation of air through the upper space and between it and the lower air is caused by such fans as there may be, by the temperature differences of windows and radiators, and by the body heat and movement of the people in the room, this last effect fortunately varying in proportion to the crowding and contamination and need for sanitary ventilation. An odor of ozone in a room where there are germicidal lamps is evidence of air circulation but little ventilation, because ozone is produced only within a few inches of the lamps by traces of ultraviolet of much shorter wavelength than the germicidal.

The air circulation or interchange between the irradiated upper space and the contaminated lower space of the room visualized above is, in practice, a variable and indefinite factor almost impossible to demonstrate or measure directly. It serves, however, to dilute the contamination of the lower air by "sanitary ventilation" and there is little advantage in upper air irradiation beyond that which will maintain a 99 per cent upper air disinfection at the usual rate of air movement and interchange. Only under exceptional conditions of air interchange at 30 feet, or more, per minute are about double the above specified numbers of fixtures required to maintain a 99 per cent disinfection of the moving upper air.

Sanitary Ventilation

Direct air sampling shows that irradiation of the upper air in a room will make it nearly as free of bacteria as outdoor air; as if the ceiling and walls above the 7-foot level were removed. Sampling of the lower air shows that the local interchange of air between the upper and lower levels nearly always provides a "sanitary ventilation" equal to 1 to 2 air changes per minute or 60 to 120 changes per hour. This is a reduction in the lower air contamination such as might be produced by dilution with outdoor air through wide open windows on a windy day.

Fans and Circulation

Since the safe and generally useful upper air method of air disinfection is entirely dependent upon the very variable air circulation in a room for its dilution effect on the lower air it may sometimes be desirable to provide a constant amount of air movement by means of fans. Such fans should have a total C.F.M. rating at least one half the volume of the lower air of the room, and should gather air from about the 5-7-foot level and discharge it across the ceiling. There should be a maximum of vertical air movement without local drafts or dust pickup from the floor.

Useful air circulators may be installed in the upper corners of a room by placing exhaust fans in the upper center of panels across the room corner and extending down from the ceiling to 6½-7 feet from the floor. A side wall type of germicidal fixture may to advantage be mounted at the lower edge of the same panel. Two such units with 30-watt germicidal lamps and 1500 C.F.M. fans would be suitable for a standard schoolroom.

AIR DUCT DISINFECTION

There are many places where it is desirable to make the air carried by a duct equivalent to outdoor air in freedom from live bacteria. This can be easily done with General Electric germicidal lamps but the number required is not so simply determined as for the upper air of rooms because of the high and variable air speeds and the great variations in duct shapes. For ducts whose greater dimension does not exceed the lesser by more than 50 per cent, and with non-reflecting walls, the maximum lamp requirements for a 99 per cent disinfection may be read from the following table. If the cubic feet per minute of air flow is not known it may be calculated as the product of the duct cross-section, in square feet, and the air speed in feet per minute. To determine the minimum lamp requirement in flat ducts or in case of a reflective duct lining refer to the engineering data and discussion available elsewhere.

Note in the following tables that the C.F.M. figures in the body of the tables are directly proportional to both the number of lamps and the lesser dimension of the duct so that the tables may be expanded indefinitely by direct proportion and by lamp addition. For example, the requirement in 30-watt lamps for 220,000 C.F.M. of air carried by a 120 by 150-inch duct would be 10 times the 9 lamps required for 10,800 C.F.M. in a 60-inch duct, or 90 lamps.

The simplified formulae of the following tables are:

$$N_{30} = \frac{\text{C.F.M.}}{20 \times D} \text{ for 30-watt lamps}$$

and

$$N_{15} = \frac{\text{C.F.M.}}{8 \times D} \text{ for 15-watt lamps.}$$

The above example then becomes

$$N = \frac{220{,}000}{20 \times 120} = 91$$

For a 95 per cent disinfection but seven tenths the above number of lamps may be used, for 90 per cent one half, and for a 70 per cent disinfection only one quarter as many. Installations to deal with bacteria that have been exposed to a relative humidity greater than 60 per cent and to deal with fungi require many more lamps than are called for in the following tables and should be treated as special cases for which engineering data are available elsewhere.

Flat Ducts

In the frequent case of flat ducts having one dimension two or more times as great as the other there should be reference to more detailed methods of calculation available elsewhere but the maximum lamp requirements may still be determined from the following tables by subdividing the duct, and the air capacity, so that the dimensions of the subdivisions fall within the range of the tables. For example, a 2-foot by 9-foot duct carrying 9000 C.F.M. should be treated as 3 ducts each 2 feet by 3 feet and carrying 3000 C.F.M. The tables call for a maximum of eighteen 30-watt lamps but if the duct is calculated as a whole by a more adequate method the number is reduced to 15 lamps.

Duct Installation

The mechanical details of a germicidal lamp installation follow closely those of the dust filter installation and it is anticipated that manufacturers will provide similar standard unit assemblies. Although there are many ways of installing germicidal lamps in air ducts, the best compromise on the mechanical and radiation factors calls for placing them lengthwise on the duct wall, on 4-5-inch centers grouped in the center half of the duct walls and out of the corners of rectangular ducts. The duct walls near the lamps and the duct width in both directions from them should be of polished chromium plate or aluminum if the conditions are such that the reflective duct walls can be easily cleaned whenever the lamps are cleaned. Standard wiring channel strips, such as are used with the corresponding fluorescent lamps, may be attached to the outside walls of the duct with the lamp sockets projecting through holes in the duct walls and the reflector lining. Two-lamp assemblies using high power factor ballasts and moisture-proof lampholders, especially designed for this type of installation are commercially available.

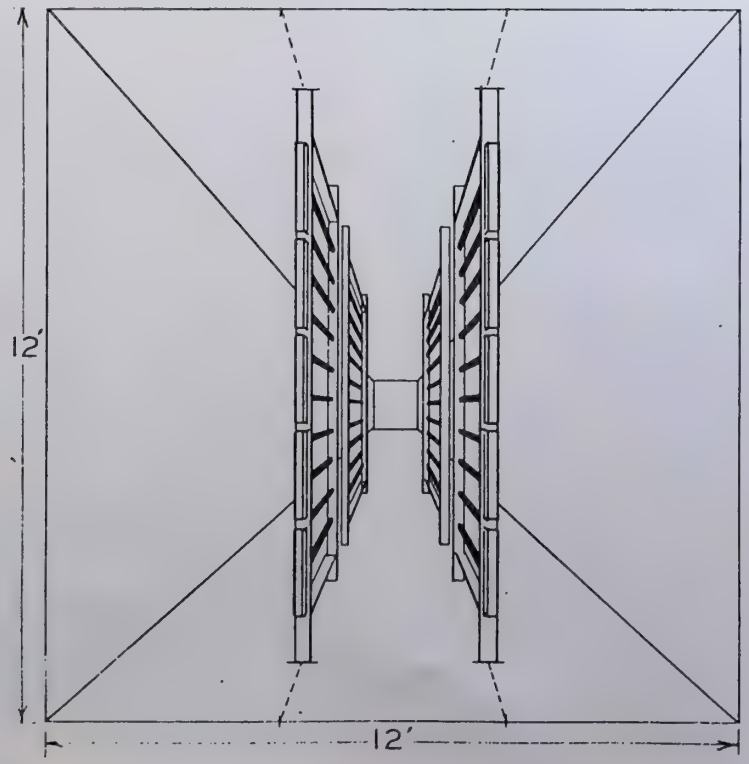
Since the germicidal lamps must be kept reasonably free of dust, there must be convenient access for cleaning. This can usually be arranged by hinged panels on the sides or the bottom of the duct, and, if necessary, the lamp may also be mounted on these panels as well as on the stationary duct walls. Where the mechanical conditions demand it, the lamps may, of course, be installed end to end along the duct. In any case, the reflector lining should be used on all walls of the duct and should extend beyond the ends of the lamps a distance twice that to the opposite side of the duct. If chromium plated sheet steel is not available aluminum foil surfaced building paper or board, or certain special aluminum paints may be used as substitutes.

In large ducts and plenum chambers germicidal lamps may be assembled like the rungs of a ladder in vertical frames supported out in the center of the chamber in whatever series or multiple arrangement best fits the local conditions and provides access for cleaning and replacement. In very large ducts, where the air speeds are relatively low, the lamps should be so placed, when possible, as to provide a maximum average distance from the lamps to the duct walls in directions perpendicular to the lamp tubes, and regardless of the direction of air movement.

There is a special installation problem in case of flat ducts which may have one dimension 4 to 6 times the other. Such a duct cross-section limits the effectiveness of the lamps not only in proportion to the lesser dimension but also because but little of the duct volume beyond the actual location of the lamps is useful for air irradiation. In such cases the lamps should be distribuated only over the longer duct walls to within the lesser dimension from the edges.

In spite of the desirability, for efficiency, of the longest possible travel of the ultraviolet before the first reflection, it is sometimes desirable to combine the bactericidal treatment of air with the humidifying, filtering, and heating treatment it gets in an air conditioning system. In such cases, it is desirable, when possible, to provide the bactericidal treatment at a point of average air temperatures, away from very hot air or very cold make-up air to maintain germicidal output efficiency. When possible, the lamps should be placed after the filtering which reduces the lamp cleaning, but before the humidification which tends to increase the tolerance of bacteria for germicidal ultraviolet and may, in extreme conditions, cause electrical trouble in lampholders and starters mounted in the chamber with the lamps.

IN LARGE DUCTS and plenum chambers, germicidal lamps can be assembled like the rungs of a ladder in vertical frames supported out in the center of the chamber in whatever series or multiple arrangement fits the local conditions and provides the access for cleaning and replacement. In very large ducts, where the air speeds are relatively low, lamps should be placed to provide maximum average distance from lamps to duct walls.

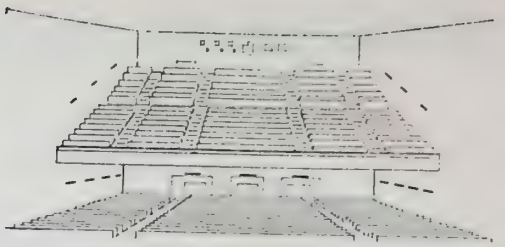


Air Circulators

There are many places where air disinfection is desirable but not practical by the upper air method because of a low ceiling nor by the usual duct method because of an inadequate duct service or none at all. In such cases the equivalent of a local air recirculator may be provided as has already been suggested for elevator cabs. Such a recirculating air disinfector for use in buses may take the form of a coaxial fan in a 6-to-7-foot length of circular duct containing several germicidal lamps and connected directly to air supply and return ducts lengthwise of each side ceiling. A 500 C.F.M. fan in a 12-inch duct containing two 30-watt lamps would provide air disinfection in a 30-passenger bus equivalent to an air change every two minutes or 30 per hour.

THEATRE APPLICATIONS

Air disinfection in the ducts and in the open spaces of theatres and public auditoriums can be done with germicidal lamps in accordance with the tables provided for smaller rooms except that an air interchange rate of 30 instead of 15 feet per minute should be assumed, thus doubling the number of lamps required for a 99 per cent upper air disinfection. Since the germicidal lamp requirements in high ceiling rooms are directly pro-



USE OF FIXTURED GERMICIDAL LAMPS is indicated in these two drawings. In the case of a theatre with a balcony, the calculation should be broken up into three parts: the open space above the front orchestra section, the orchestra area under the balcony, and the space over the balcony. In all cases, the fixtures should be mounted as low as possible with the germicidal tubes themselves being visible at distances less than 25 feet, such visibility being permissible for the usual theatre occupancy, if not from the standpoint of screen brightness eye adaptation. All accessory rooms of the theatre may be treated just like ordinary rooms.

portional to their average dimensions the tables for smaller rooms may be extended to larger ones in direct proportion.

1,000-seat Theatre

The simplest case of the theatre or auditorium is that without a balcony, with dimensions of about 70 by 100 feet, and with a 30- to 40-foot ceiling height. A seating capacity of 1000 may be considered representative of such an average theatre. The average dimension of 85 feet and the possibility of a 20- to 30-foot fixture-to-ceiling distance indicates the need of four times the number of fixtures specified for rooms of one half that average dimension, or a total of 8 to 12 (depending upon the type) to provide a 99 per cent upper air disinfection at a 30 feet per minute average air interchange. This is provision for a lower air disinfection at a rate equivalent to about 100 air changes per hour. Eight, ten or twelve units would usually be installed for symmetry. They should be placed as low as possible without the germicidal tubes themselves being visible at distances less than 25 feet, such visibility being permissible for the usual occupancy, if not objectionable from the standpoint of screen brightness eye adaptation.

The illumination provided by such an installation, equivalent to a total of only about 800 lumens, or 50 watts in filament lamps, may displace some if not all of the usual running lights or standby illumination.

The need for only three or four times as many lamps for such a room as for a standard schoolroom illustrates strikingly the fact that the effectiveness of a germicidal lamp varies directly in proportion to the distance the ultraviolet travels through air before absorption.

Theatres With Balcony

In the case of a theatre with a balcony the calculation should be broken up into three parts, the open space above the front orchestra section, the orchestra area under the balcony, and the space over the balcony. A typical larger theatre with balcony and seating about 2000 people would have an orchestra area about 90 feet wide and 90 feet deep, one half of it being under a balcony, 90 feet wide and about 60 feet deep. The ceiling height over the front orchestra would be about 50 feet, over the back orchestra 12 to 18 feet and over the sloping balcony 25 to 10 feet.

The general tables for fixture types indicates 1 to 2 units for average dimensions of 30 to 35 feet or 4 to 8 for 75 feet (90 plus 45 divided by 2) and a doubled rate of air circulation. Because of the lower ceiling height for the same area under the balcony 8 to 16 units would be needed. For the area above the balcony with an average dimension of 75 feet the lamp requirement would be 8 to 12 depending upon the type.

In all cases the fixtures should be mounted as low as possible without the germicidal tubes themselves being visible at distances less than 25 feet, such visibility being permissible for the usual theatre occupancy, if not objectionable from the standpoint of screen brightness eye adaptation.

For this typical balcony type theatre, seating about 2000 people, the total germicidal lamp requirement for the seating areas would be about 20-36 30-watt units, illustrating again the way in which large room dimensions and ceiling heights increase proportionately the air disinfecting effectiveness of the ultraviolet. All the accessory rooms of the theatre, such as lounges and rear lobbies may be treated as ordinary rooms of transient occupancy and one 30-watt fixture of Type 1 or 2, for each 200-250 square feet of floor area, or one Type 4, 6, or 8 fixture for each 350-400 square feet, is suggested for the usual ceiling heights.

Ozone Considerations

Since the ozone-producing ultraviolet from germicidal lamps is completely absorbed by a few inches of air, the ozone it produces does not increase with the room dimensions as does the air disinfecting action of the unabsorbed germicidal ultraviolet. For this reason ozone is not likely to be even detectable in a ventilated theatre nor at all objectionable for such an installation as has been suggested for accessory rooms.

Illumination From Lamps

The light provided by such an installation as that suggested for the larger theatre seating 2000 would be equivalent to only about 3200 lumens, or the illumination from 200 watts in filament lamps, and so might displace some if not all of the usual running lights or standby illumination. This illumination would not in any case be objectionable except perhaps as related to the immediate surroundings of the units, a matter to be considered in the location of the units when installed.

In theatres where an unusually dark auditorium is maintained during projection, light from the germicidal lamps and scattered from the side walls and ceiling may be objectionable during the projection of Technicolor pictures. In many theatres this problem can be solved by a proper location of deeply louvered cylindrical parabolic reflecting units in the center part of the auditorium ceiling to restrict all light and ultraviolet to the floor area of the auditorium and balcony. Such an installation requires special engineering treatment.

Artistic Installation

There can be considerable freedom of choice as to the location of germicidal fixtures on the theatre side walls and every effort should be made to fit them into the architectural and decorative features of their surroundings, even to the extent of enclosing stock fixtures in custom-made enclosures. Even a horizontal position is not esseential and, for an extreme example, there may be places where the germicidal lamps can be placed vertically facing towards the stage or may be located in recessed places already provided for the lighting sources so long as there is an unobstructed exit angle of at least 60 degrees and a distance of at least 15 feet to the nearest theatre seat. The fundamental considerations are: placement to prevent momentary exposures of faces and eyes at distances of less than 25 feet; placement to secure the longest possible travel of all the ultraviolet before absorption by the walls, and as inconspicuous a placement and finish as possible.

Duct Installation

Although germicidal lamps are much less effective in ducts than in large open spaces it is believed that they should be installed in the ventilating and heating ducts of the theatre to insure that the recirculated air handled by the duct system is as free from disease-producing germs as the make-up air introduced from the outside of the building. Since it is a common practice to vent the incoming air through grills under the theatre seats any odorous condition of the circulated air is apt to be very noticeable and the traces of ozone produced by a duct installation of germicidal lamps often have a worthwhile deodorizing action on the recirculated air. Simplified methods of calculating the number of germicidal lamps required for ducts of various sizes and air velocities are detailed later and apply to the theatre installation.

Notes on the Technique of Handling Crowds

Efficient Direction of Thronging Patrons Helps Box-Office Business and Good Will

"Keep 'em Moving!"

There's gold in them thar three little words! Ever since Barnum, worried about the slowness of the turnover in his American Museum, cooked up the idea of directing folks "To the Egress," showmen have thought along this line.

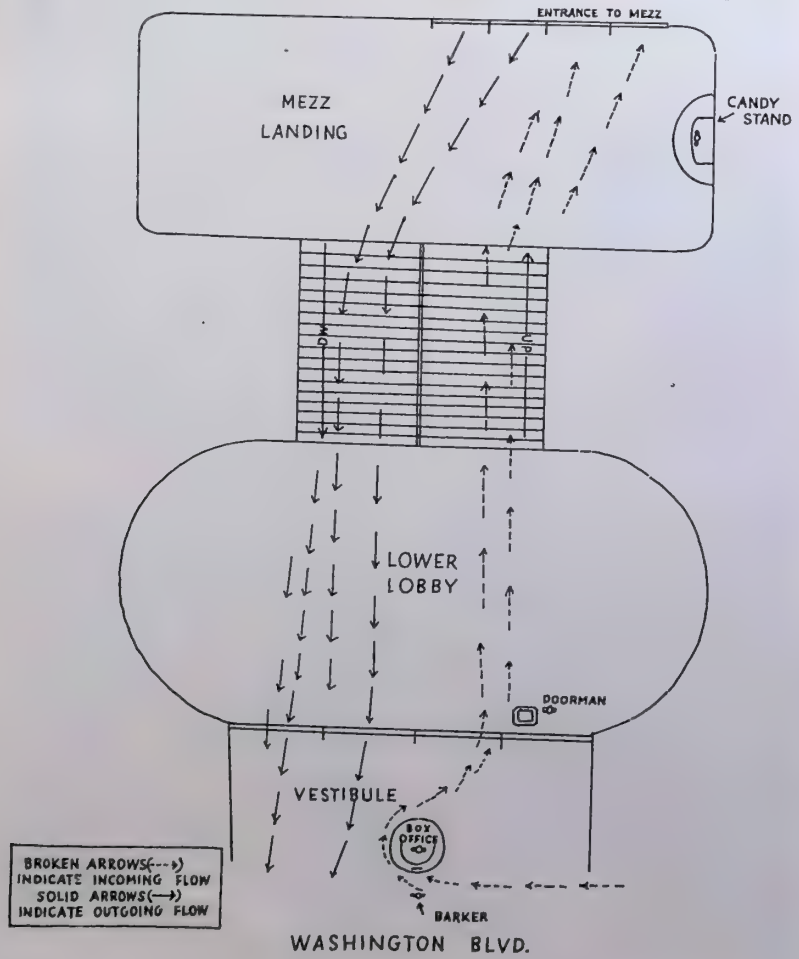
Correct calculation of time schedules and the proper handling of crowds during busy week-ends can make a difference of from $1,000 to $3,000 in the weekly gross of the average first-run or key Loew neighborhood theatre. That is on the record; no guesswork on the part of the editor!

This article, with illustrations, has been reprinted from the September, 1946, issue of Lo!, by permission of John Mitchell, editor.

NO LAW VIOLATION

In our battle for the Almighty Dollar, we are not recommending that any theatre manager violate the law or take unnecessary chances in trying to pack too many people into his theatre. We know, that by filling all singles, getting full capacities in our balconies, and by systematic handling of spills, we can increase our grosses on a busy day without running afoul of any city or fire department ordinance.

HANDLING PATRONS FROM THE BOX OFFICE, through the lower lobby, to the mezzanine can be tricky, especially in theatres designed like Loew's State in Saint Louis, where the physical layout necessitates extreme care in handling crowds. Here patrons enter the theatre and proceed up a grand stairway to the mezzanine. Patrons are spilled through street-level exits. Patrons do not have to descend the stairways and meet the entering crowds.



Each theatre has a different physical problem. In the houses which follow an orthodox architectural plan — lobby, foyer, seats—one right after another, handling the people is simple. The boys who have the greatest nightmares are the managers of these houses built on the side of a hill, where the street-level entrance is on the mezzanine (Capitol Theatre, Washington, and State Theatre, Saint Louis, for examples) or houses like the State Theatre, Memphis, and Orpheum Theatre, Boston, with long lobbies and stairways leading to the orchestra floor. You will note several diagrams appearing with this article. They illustrate how some of the "odd" houses handle the flow and spill of their audiences.

SHOWMAN'S MOTTO

To get back to the showman's motto: "Keep 'em Moving"—keep 'em moving and they won't ask for refunds. Keep 'em moving and they'll be happy, not restless. Keep 'em moving and watch how your receipts grow.

KEEP 'EM MOVING

The slogan is simple and the psychology in back of it is elementary. As long as folks are on the go they'll believe or feel that they soon will be seated, which is probably the case. But have your customer stand in one spot for any length of time and you'll have a very uneasy patron in your crowd. He is apt to take a pessimistic view of the whole matter.

Now, if your patron continues to move every few minutes, even if only a few yards, he will maintain an optimistic viewpoint. As long as John Q. Public is moving towards the promised seat he is easy to get along with.

But to "keep 'em moving" requires considerable planing; a well-trained, efficient and ultra-courteous service staff, and some smooth and shrewd strategy.

In the first place, it is well to remove all furniture (that can readily be removed) from the sections of the lobbies where you will have standees, which should be accomplished some fifteen minutes or so before the first rush is expected. This is an obvious way to utilize space where it counts most.

USE SIGNALS

It is important, both from a practical and psychological angle, to have the service staff employ a set of signals while on the floor. By this means much time and confusion can be saved, and the customer, who otherwise would become confused and excited by incessant chattering and calling back and forth by the ushers and doormen, is more apt to remain calm and undisturbed. Signals especially work wonders in the auditorium where an usher standing deep in the orchestra pit can accurately advise another

usher at the very head of the aisle as to number of seats available and whether single or double.

Although there are many sets of signals in use throughout the theatres in America, one particular system which is employed with considerable success in a large Loew's New York house could well serve as a model for all theatres. The signals, which are simple and easy to remember, include the following:

1. Flashlight cupped in hand producing red glow indicates a double or two seats togther are available. This is used between usher in the orchestra and usher at head of aisle.

2. Light flashed on and off towards the floor indicates single seats available. One flash means one single seat is empty; two flashes two single, separated seats, and so on.

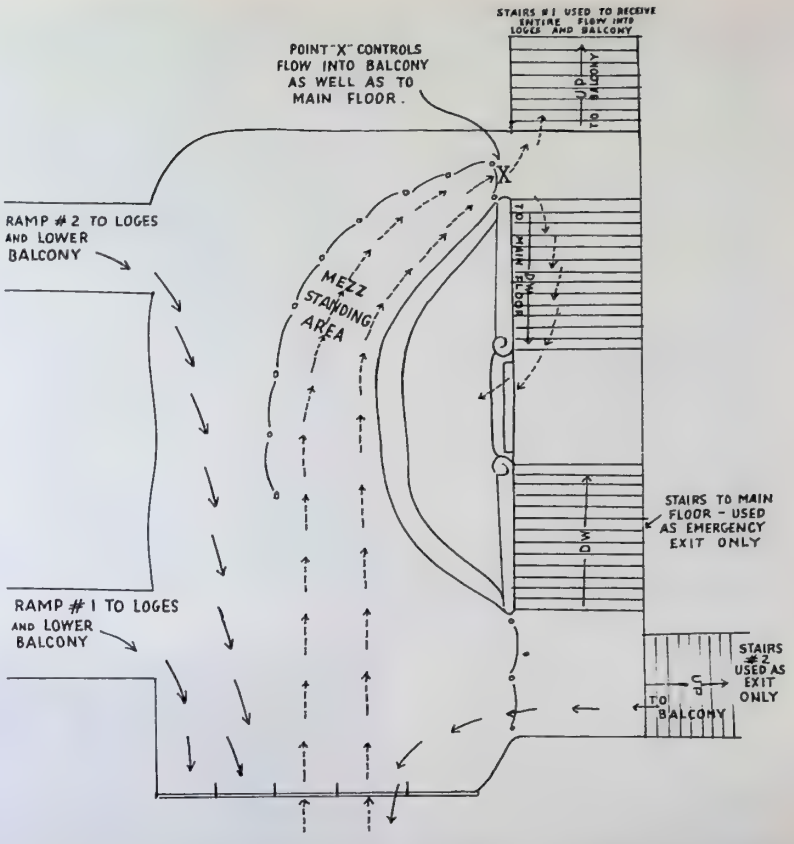
3. In the lobbies, a clenched fist will indicate either "seats for two" or "send on two more" according to the individual situation.

4. For moving up groups of people fingers and a twist or roll of the hand can be the sign. One finger and a twist or roll of the hand would mean "send on (or up) 10" or "cut 10"; two fingers and a twist or roll of the hand "send 20," or "cut 20," and so on by groups of 10.

Of course, there are other signals, many more, but these are the basic ones for fast filling of a theatre.

TRAIN YOUR USHERS

The ushers, it can be seen, are important in the feeding and emptying of a movie house. How good they are at this particular job is a reflection of the thoroughness with which they have been trained by the chief of staff or manager. Since proper handling of standees during busy weekends, on opening days for pictures like "Easy to Wed" and "Holiday in Mexico," and on other peak days can make a difference in the weekly gross, it is a vital necessity that every theatre maintain an efficient, well-trained and congenial service staff.

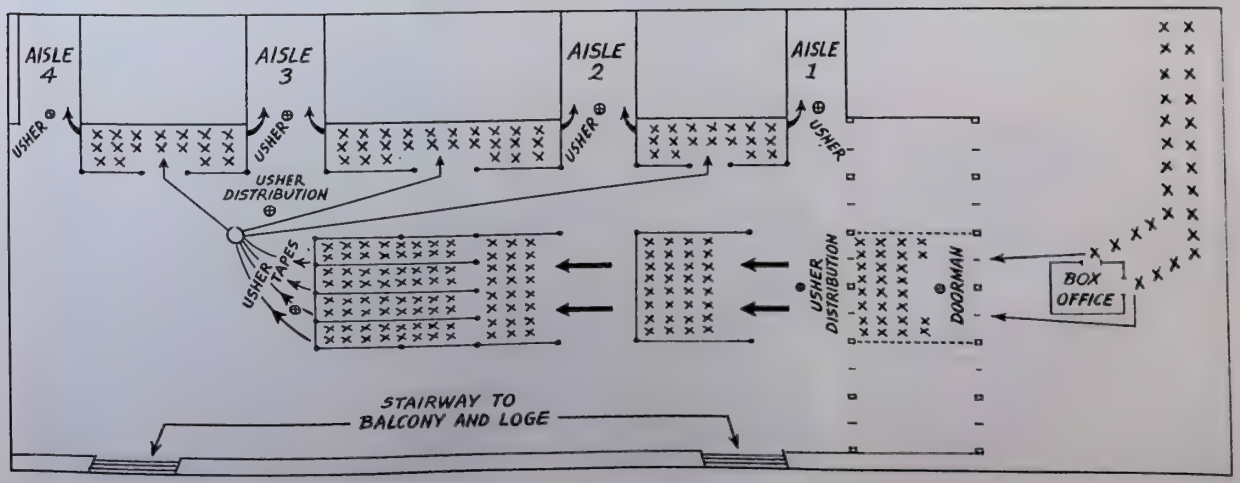

STAIRS #1 USED TO RECEIVE ENTIRE FLOW INTO LOGES AND BALCONY
POINT "X" CONTROLS FLOW INTO BALCONY AS WELL AS TO MAIN FLOOR.
UP TO BALCONY
X
TO MAIN FLOOR
RAMP #2 TO LOGES AND LOWER BALCONY
MEZZ STANDING AREA
DOWN
STAIRS TO MAIN FLOOR - USED AS EMERGENCY EXIT ONLY
RAMP #1 TO LOGES AND LOWER BALCONY
STAIRS #2 USED AS EXIT ONLY
TO BALCONY

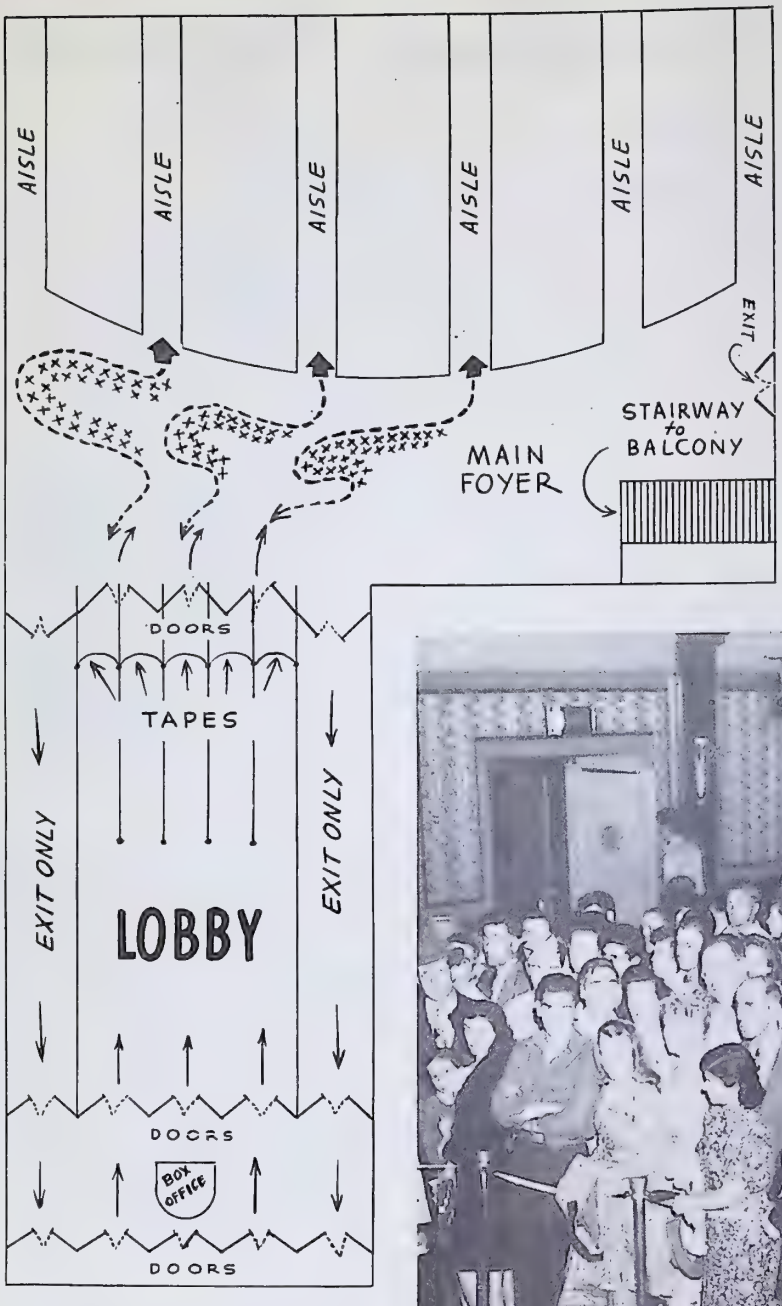
THE MEZZANINE STANDEE AREA of Loew's State, Saint Louis, is taped off, from which the patrons are fed by way of stairs down to the orchestra foyer or up to balcony and loges. (Dotted lines indicate incoming flow, solid lines the outgoing flow.) Efficient handling of crowds helps to build good will for a theatre, by making the waits short and moving the crowd as to create the impression that the management is interested, too, in quick seating.

This training of the staff must always include instruction on handling a crowd in cases of emergency and talks on the psychological weapons employed to avert panics. Each member of the theatre staff should know the location and the method of handling the fire-fighting equipment.

Experience has proved that the triple line in front of a movie house, even when three boxoffice windows are open, is impractical. The double line, with tapes, is the safest and soundest means of con-

IN THEATRES OF MODERN DESIGN, with spacious foyer space, as here in Loew's American Theatre, in The Bronx, New York, patrons are held out in center islands, from which they are fed into the standee space behind the banks of orchestra seats. Note the progression of crowds from the outer lobby to the second and third foyer islands. Note also the placement of ushers, so that the population of the several center islands, no less than that at the aisle heads, can be moved with greatest efficiency. As long as the patrons move, they will feel that they soon will be seated, and such progressive arrangements as shown here, help to further this idea.





AN EXTREMELY LONG ENTRANCE LOBBY, such as that of Loew's Valencia (above), in Jamaica, New York, can be channeled off with permanent standee rails. The patrons, waiting between the various rails are fed, alternately, into waiting areas in the inside foyer. Traffic is further controlled by utilizing for exit only the outside quarters of the area, leaving the inside half for the incoming patrons. With expeditious handling, patrons will take virtually show-long waits in good grace, particularly if the usher staff is courteous and there is yet some occasional forward movement.

ONE REASON that these people, photographed in the lobby of a Loew's theatre, are patient is because they know it will be "first come, first served" when seats are available. Patrons should always be served in turn, with no favoritism, expressed or implied, tolerated at any time. Nor should theatre attaches tolerate any line or gate-crashing, and all ushers should be instructed exactly what to do when such aggrevations are foisted upon the patiently waiting throng. Yet all reprimands should be made with firmness and, above all, with tact. Morale of patrons will be heightened.

trolling a crowd and hustling your patrons into the show.

DISCOURAGE CRASHERS

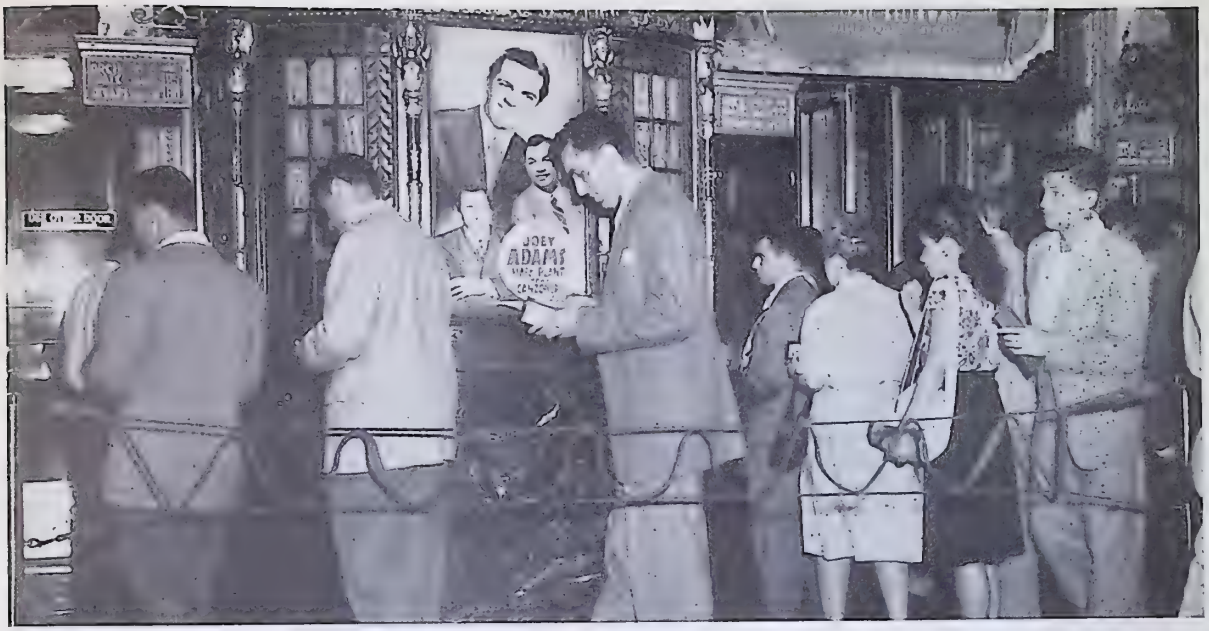
Maintenance of an orderly line is a necessity if customers are to be moved safely and quickly. Crashers who like to duck under tapes and beat the rest of the crowd can be discouraged by use of the double tape in front of and on the side of the box office. A doorman posted at the exit side of the entrance to the theatre will discourage line-crashers from trying rear-guard action at the tills.

Doormen have a say in Saturday night receipts, too, for besides line-crashers there are gate-crashers. A doorman will do well to permit only those holding their own tickets to enter the inner lobby or auditorium. "Joe has the tickets" is an old gag that st ll works.

"BETTER CHOICE IN BALCONY"

When the orchestra is at least half-filled it is well to start pushing 'em upstairs. This will take the pressure off the orchestra.

Plugging the balcony can be done with a simple statement of the facts such as



SEPARATING willing, eager patrons from their cash is quickly accomplished by use of tapes, and double ones, as shown below, are an especial deterrant to those who would try to jump ahead in an orderly line.

AT THE AUDITORIUM AISLEHEADS in Loew's State, Saint Louis, the patrons are held, glimpsing the screen first from standing areas No. 1 and No. 2. At this theatre, the patrons go to all seats on the main floor from these two standing areas. Departing patrons are spilled through side exits on the street level, rather than being sent out of the theatre by retracing the incoming route. Thus the one-way-in traffic is maintained for efficiency's sake.

"There is a better choice of seats in the balcony. There are front, side and box seats only on the main floor."

Both the balcony and orchestra should be fed from the foyer and lobbies in such a manner that those patrons who come first, are seated first.

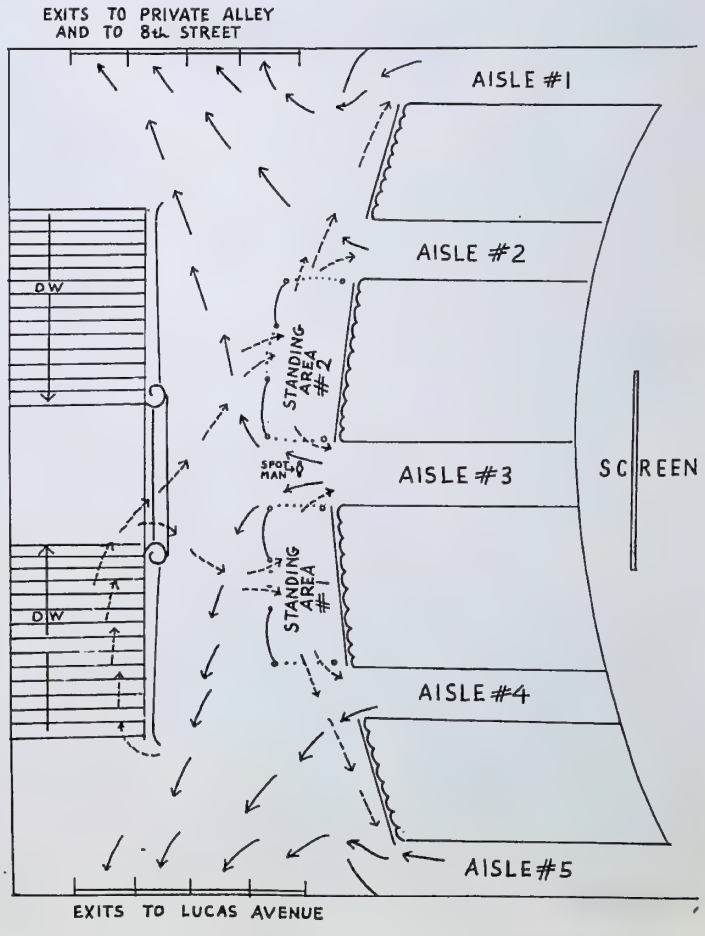
In this connection, ushers and floormen should keep an accurate check on seats at all times and fill seats systematically so as to avoid too many single seats. When handling crowds ushers must see that front seats and single seats are kept filled at all times. The entire staff should be aware of the time of the next "break."

When the "break" or "spill" comes all exits in the theatre may be utilized so as to empty the auditorium as efficiently and as quickly as possible. If possible, light up for a big break. More can be accomplished in two minutes with a lighted house than in several minutes with the house dark, and with far less confusion.

COURTESY COUNTS

The break is what the staff has been waiting for. With clear and courteous phrases, such as "Step up in line, please," "Keep the line moving, please," "Kindly tell the cashier how many, please," "Have your change ready, please. The admission price is—," and "Better choice of seats in aisle 2, please!" an alert service group once more quickly fills the bulging cinema. All phrases used have a generous sprinkling of "please," "kindly," "thank you," "yes, sir" "no, sir," "yes, ma'am" and "no, ma'am."

A theatre employee should be constantly on the alert to guard against using phrases that tend to make the patron feel that he (or she) is being "ordered" or "driven." Tactless directing of patrons is a frequent cause of request for refunds.



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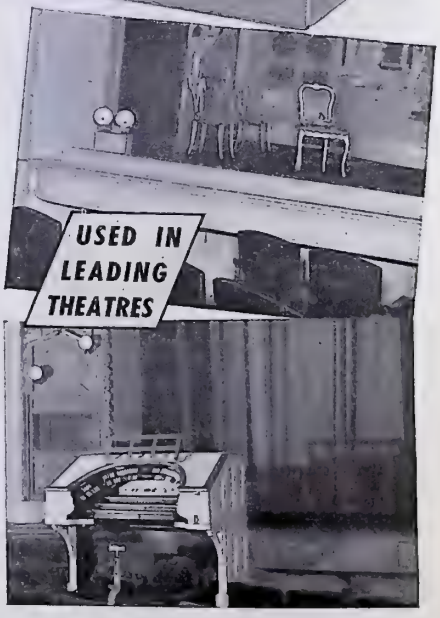

Upper photo—view at Wilbur Theatre, Boston
Lower photo—view at Loew's State Theatre

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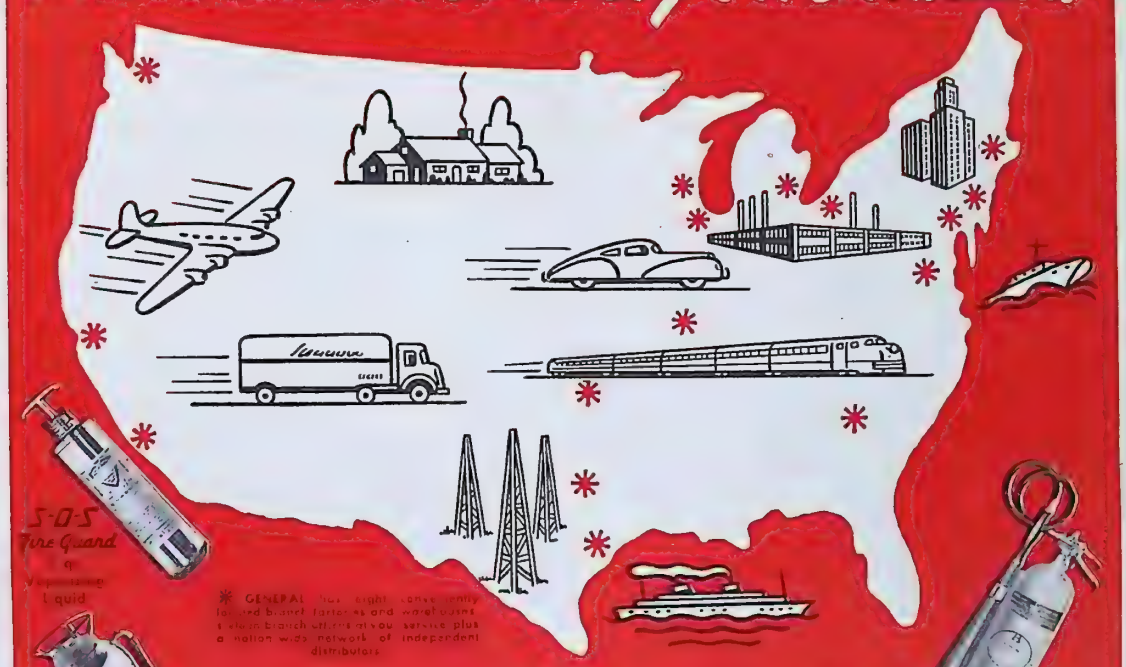

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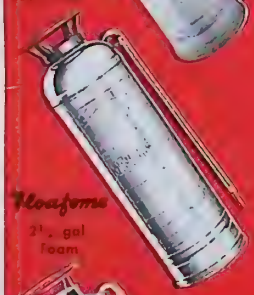

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The West Disinfecting Company occupies a singular position in its field, since it offers such a complete line of products and services for the promotion of washroom sanitation and personal cleanliness and has been a leader in the promotion of public health for over half a century.

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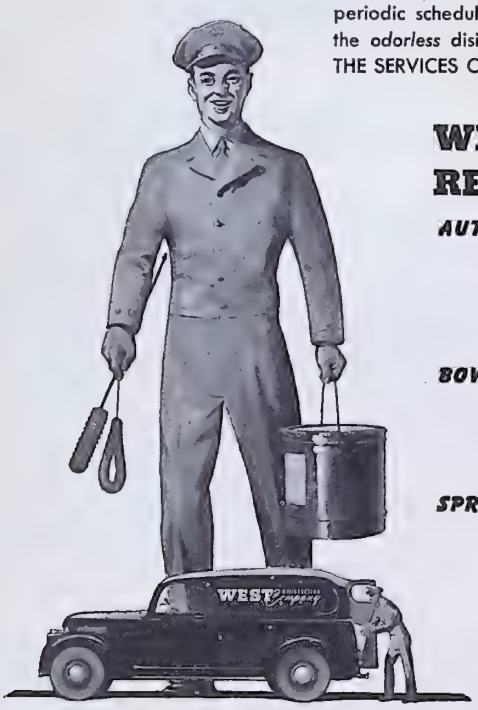
To supplement the regular duties of your janitors, *specially trained West Service Men,* experienced in using proper disinfecting and deodorizing materials in the most efficient manner service your washrooms on a regular periodic schedule. The cost is surprisingly low. Your purchase of Westamine, the *odorless* disinfectant, West Bowl Cleaner and West Deodorants INCLUDES THE SERVICES OF WEST SERVICE MEN WITHOUT ADDITIONAL CHARGE!



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The West Automatic Drip Machine is designed to meet a need of proper washroom deodorization in a simple, economical and efficient method. When placed above toilets and urinals, an aromatic liquid constantly drops into the bowl, tending to overcome washroom odors at the source. This machine also deodorizes the air of the entire washroom. West Service Men inspect and refill these automatic devices as required.

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Even over a comparatively short period of time, traps of toilet bowls and urinals collect certain salt and sugar secretions, causing offensive odors and unpleasant conditions. West has developed a special material which West Service Men use to perform the necessary job of heavy duty cleaning.

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WESTAMINE is an odorless disinfectant used by West Service Men, especially designed for the routine spraying, cleaning and scrubbing of washrooms. It is especially prepared to fulfill the demand for a spray fluid of definite bacteriological strength without an odor.

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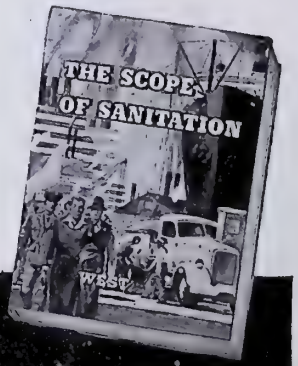

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SECTION 3 - F

EXTRA PROFITS

1946-47

Designing for Modern Open Candy Display

Suggestions on the Uses and Construction Of Candy Stands in Theatre Merchandizing

SAMUEL L. LOWE
President, Theatre Candy Company, and Editorial Consultant to EXTRA PROFITS

This is an article on how you, the theatre operator, can develop, increase, and stimulate a most valuable source of income, which is a definite adjunct to the motion picture business.

If you were offered a constant, easy source of substantial income, would you refuse?

Your utmost attention, interest and awareness of your theatre's latent possibilities for the sale of candy, popcorn, soft drinks, ice cream, and other related items is merited by the results that can be obtained.

Before the war, one 5-cent confectionery and corn sale for each theatre admission was not uncommon. Today, the ratio of sales to admissions is often better than one to one.

Why?

There are several reasons. The public's increasing acceptance of candy and related products is one, the theatre operator's increased merchandising efficiency, and the general improvement in theatre business and in the public's finances are others.

Your job is to sustain your present volume if candy, popcorn, and so forth, are being well merchandised by you now, or to increase your sales appeal if you are not producing what you should. Thus, the gradual return to normalcy, when there is a free flow of sugar products, will find your theatre able to hold, and even increase its present volume of candy and related sales.

We will endeavor to advise you of ways of merchandising, how to select and design proper equipment, and be ever ready to answer such questions as you may submit.

Our first consideration in determining what constitutes proper merchandising of candy, popcorn, and other related items in the theatre is an evaluation of the equipment utilized for the purpose. Without attempting to set up any rigid rules, it may safely be said that proper equipment is that which presents the merchandise for sale in an attractive, clean, and appealing manner. Thus sales appeal is based on such factors as proper display, evident sanitation, and eye appeal, which add all important impulse sales to whatever residue of demand sales already exist.

Naturally, in selecting equipment which embodies these important factors, it is also imperative to choose efficient equipment. If sales appeal is induced, but cannot be served, the merchandising effort is in vain. Since the patron has come to the theatre for the primary purpose of viewing entertainment, and not of making candy and popcorn purchases, sales efficiency is absolutely necessary. Rapid selectivity of choice and speed of service are a must in encouraging repeat sales. No theatre patron will countenance delay, but will rather forego his appetite in his typical American hurry to "get a good seat" and "see the show."

THE CANDY COUNTER of the Lee Theatre, Lee, Massachusetts, is an excellent example of the type of displays discussed in this article, and is a real-life use of the form presented in Figure 5. Whether such displays are set flat against the wall in the lobby, inset into a lobby wall or riser behind the main floor seats, the seller at the wall stand serves from the side. Due to this side service, only the open type of display is usually possible.

PRIMARY CONSIDERATIONS

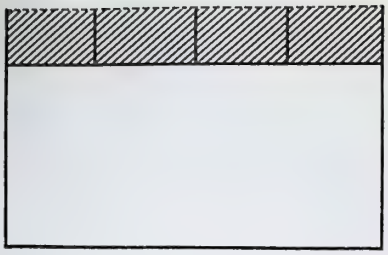
Within the range of equipment which is efficient and has the other factors necessary to sales appeal, there is a comparatively wide choice. Judgment on the theatre operator's part comes in selecting that which is best adapted for his particular theatre's needs and latent possibilities. The following are primary considerations in the decision:

(1) Location of the sales equipment;
(2) type of merchandising;
(3) availability and facility of sales personnel; and
(4) Investment and depreciation costs.

Let us take up these points in order.

Location

The location of the sales equipment is obviously most important. Optimum results are variously indicated in each individual location, but generally speaking best results are obtained by a "head-on" shot to the main patron traffic flow, and after the box office has been patronized (particularly if the box office is instructed to make small change whenever possible).



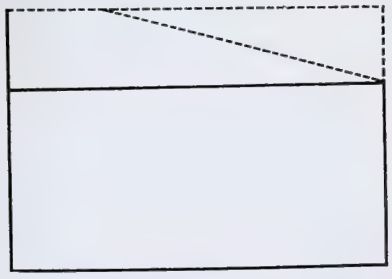


FIGURE 2—Side and top arrangements are shown here in this column. The top drawing shows an arrangement very simple to construct, requires only regular cuts of plate glass arranged on end in regular channels, and supported by clips or molding trim. The front, back, and sides are of glass, but there is no glass top to prevent the open display of the merchandise. The drawing immediately above shows the same base cabinet, but the separator strips slope toward the patron for ease in making a selection. It can be opened or closed with a flat or sloping glass top. In the display as shown immediately below advantage is taken of the slope toward the patron by using separators of various heights, held in open metal or wooded display racks. There is no top. The drawing at the bottom of the column is based on the use of a number of riser steps which can work off toward the front or at the sides, as well as in a pyramidal form. The same base cabinet is used for all four of these different types. Upon the flat bar top, several types of display merchandising may be used, constructed as part of the bar or made in separate sections to fit upon it. The height of the bar and its top superstructure from the floor, and the dimensions of the risers and top displays necessarily vary, and an almost infinite number of different methods for display are possible, but the basic service to the public is from behind the bar. Another popular and effective candy merchandiser is known as the wall type. Whether set flat against or built into the wall or behind the main floor seats, the seller serves the public very efficiently from the side of the display.

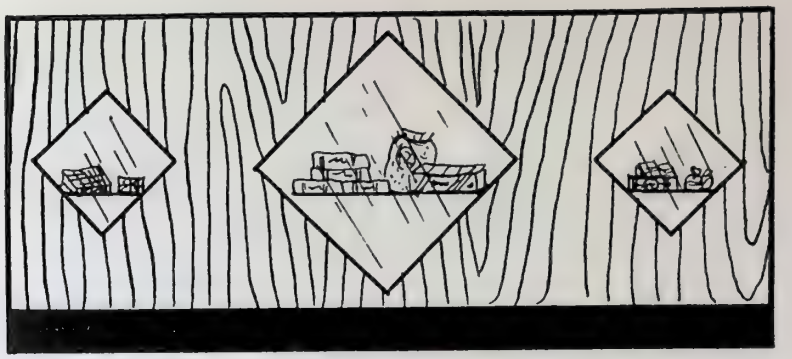
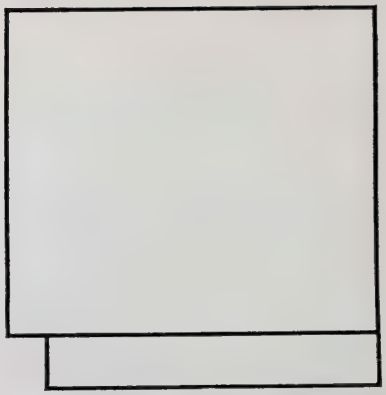
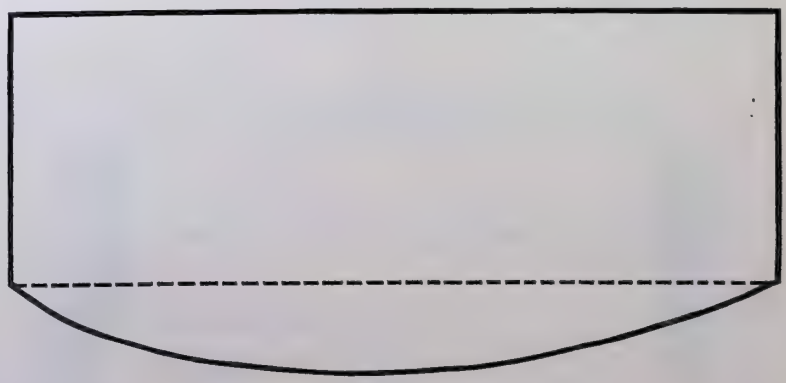
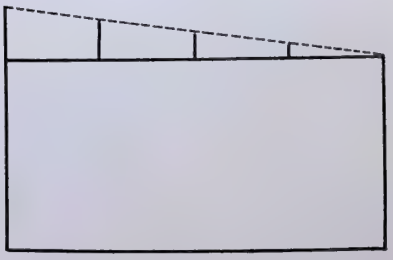


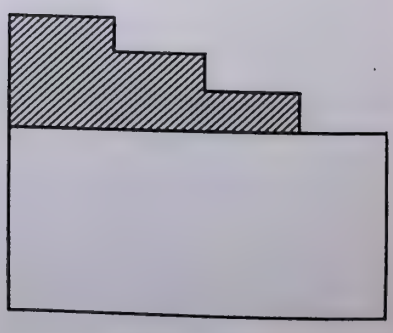
FIGURE 1—Coming in for inspection here is the front of the candy display. The most adaptable stand should not be more than 40 inches high, so that the average patron is able to look down on any of the merchandise displayed on the top. As an optional feature, glass-covered windows may be left in the front panel (top) and lighted for the display of box items or cartons of various products. An important thing in the caring for the life and attraction of the stand is to avoid its being scarred or scuffed by the feet of the more enthusiastic patrons. For this, a metal kick plate decoration should cover the bottom 6 inches, or a 3-inch recessed space (right) should be provided. For the greatest effectiveness, the stand must be kept new looking. The display top is highlighted in the illustration immediately below. The shape of the stand itself may be straight or curved, but the top surface should never be less than 27 inches in depth. The length will vary with the amount of space that may be available or needed according to each individual theatre situation. The back is shown in the illustration at the bottom of these columns. Two or more regular or sliding doors, equipped with good locks, should serve the storage compartment that should be divided into a minimum of three shelf areas. Dependent on the length, one or more built in, strongly locked cash drawers should be available. The simplest type of candy stand, and the one most often used, might well be called the bar type. Constructed in a variety of shapes and of a variety of materials in all price ranges to suit individual tastes and to fit individual situations, the basic design is comparatively simple, as will be noted in the drawings in these two columns. A straight or slightly curved bar with a flat top is constructed. The front facing the public is most

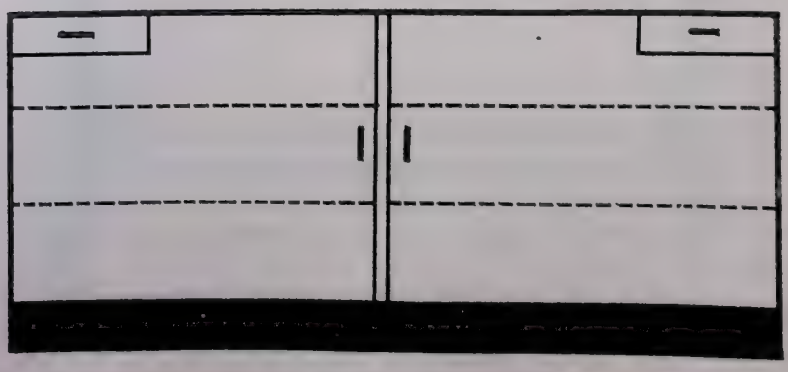


attractive if composed of translucent glass blocks, with variable lighting behind, but a fine wood or wood veneer is often used, particularly in non-permanent installations where castered displays are used.









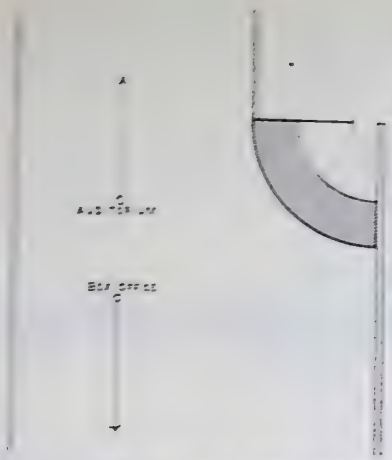


FIGURE 3—In this display, the candy stand is constructed into the contour of the lobby itself, the lobby wall serving as the real walls of the sales area. An adjacent storage room is also deemed convenient.

Merchandizing

The type of merchandising is also an individual matter. The success of chain stores, super markets, 5-and-10-cent stores, large drug and department store chains with open-display merchandising makes this type most worthy of consideration. However, it is readily admitted that where sales personnel is inadequate or inefficient, or equipment is not easily supervised by sales personnel, theft losses can be large. Type of patronage attracted to the particular theatre involved should be considered in this connection. Here also the decision must be weighed in favor of the various types of stands or machines and of the various types of pop-corn machines or of popcorn warmers as primary sales vehicles. Individual situations again apply, and expert advice can be particularly valuable here where the whole field of sales gross, personnel cost, amount and site of sales space, and net profits intermesh.

Personnel

The availability of sales personnel cannot be overlooked. Here costs again enter—what wage laws pertain, the possibility of incentive pay as against a straight pay scale, whether existing personnel can be utilized, what sales training is necessary, what the optimum schedule is for the theatre for utilizing live sales (stand type operation) and when for dead sales (automatic vending sales), what inventory and sales systems are best, and the like.

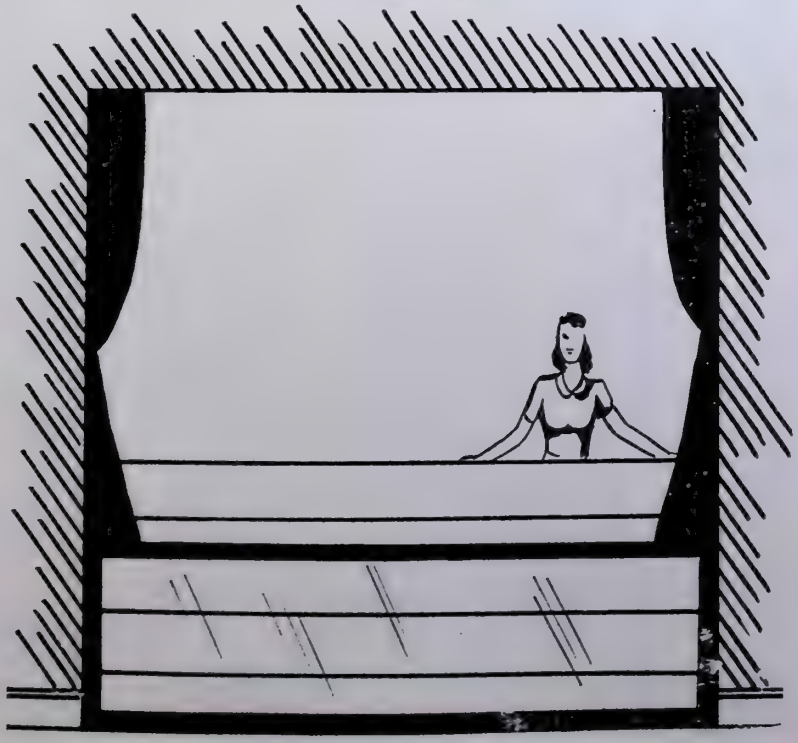
The Costs

Investment and depreciation are costs that any businessman automatically considers in his analysis of a situation. Experience is the best teacher—even if it is the experience of others. Those who have had this experience can give valuable suggestions, and save many a pitfall. As in the purchase of any product, the dependability of the manufacturer is primary. Proper care and maintenance is assumed.

CANDY STANDS

Following the selection of equipment and the considerations in the selection process, the next phase to be given attention is the basic types of candy stand merchandisers. Whereas some of the types, such as the open and closed, were previously mentioned, and an indication of their advantages and disadvantages touched on, we now intend to carry the matter a step further by concrete examples prepared by our staff artist.

FIGURE 4—A front view of one type of candy stand, where the display is set flush in the lobby wall, is sketched here. The server is usually in another room, which also permits, in the construction of the counter and display, the construction at the same time of adequate storage facilities. Candy specialists and architects should be consulted on design and construction. Candy display designers must always bear in mind local building regulations.



Bar Type

The simplest type of candy stand and the one most often used might well be called the bar type. Constructed in a variety of shapes and of a variety of materials in all price ranges to suit individual tastes and to fit individual situations, the basic design is comparatively simple (Figure 1).

A straight or slightly curved bar with a flat top is constructed. The front facing the public is most attractive if composed of translucent glass blocks, with variable lighting behind, but a fine wood or wood veneer is often used, particularly in non-permanent installations where castors are used to provide mobility. Upon the flat bar top, several types of display merchandising may be used, constructed as part of the bar or made in separate sections to fit thereon (Figure 2).

Height of the bar and its top superstructure from the floor, and the dimensions of risers and top displays necessarily vary, and an almost infinite number of different methods for display are possible, but the basic service to the public is from behind the bar.

Wall Type

Another popular and effective candy merchandiser is known as the wall type. Whether set flat against the wall in a narrow lobby, inset into a lobby wall or the riser behind the main floor seats, the seller at the wall stand serves the public from the side. Due to this fact of side-service, only the open-type of display is usually possible. The basic designs can be infinitely varied in detail (Figures 3, 4, and 5). With sides closed and front flap up, the entire case locks closed.

Room Type

The third and final basic type is known as the room type. Here the principle of the bar type is utilized. A separate room behind in a flat wall is utilized (figure 6) or it is preferable if possible to use a projecting wall (Figure 7).

From this cursory presentation of candy stand design, the theatre operator must pick that most suitable for him. Candy specialists and architects can well be consulted to advantage unless the problem is completely restricted by present building construction. However, no situation is too difficult, and such designs as the right angle wall corner stand, the combination rotating stand and machine vendor, and several other special types have been developed to overcome the apparently hopeless case.

CONCLUSION

When we summarize this discussion, we reach a single conclusion. The proper equipment for any individual theatre is based on a number of inter-related factors, factors whose general outline is quite clear but whose application to an individual theatre varies within the general outline.

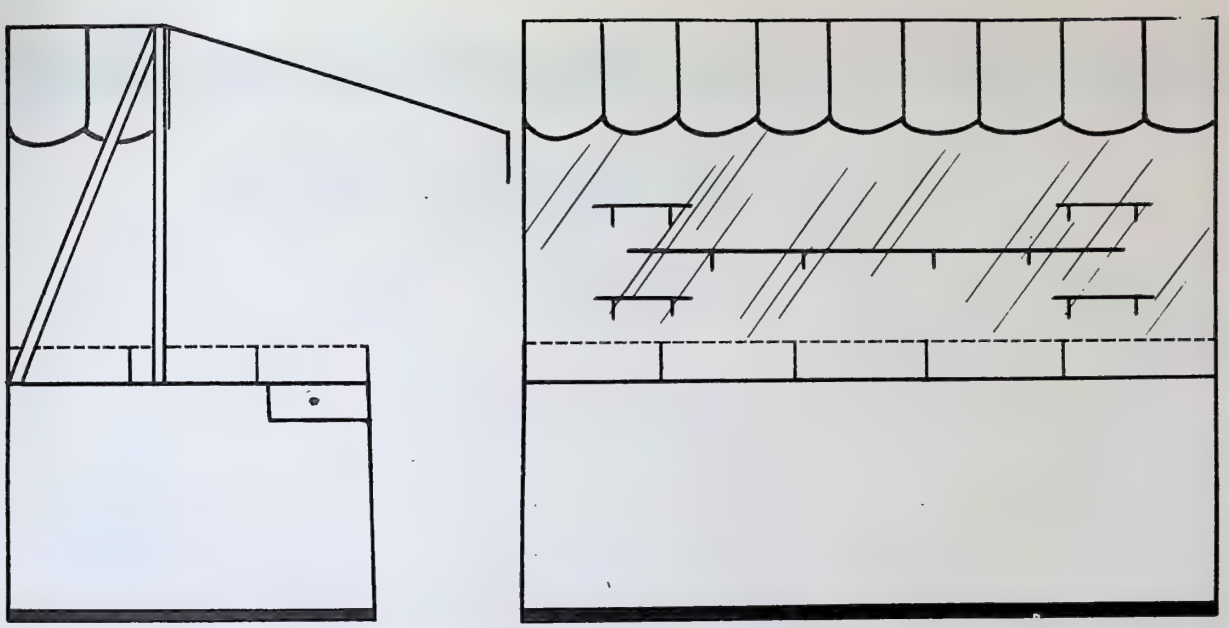


FIGURE 5 (above)—An effective display can be obtained by the use of a decorative awning mounted on overhead supports. Additional shelves can be mounted on the attractive mirrored background. A display such as this may be depended upon to help lure the patron candy-consumers over to take a look. All displays as shown on this page must be provided with strong locks. The lock must, of course, be readily available, preferably set at the side of the display.

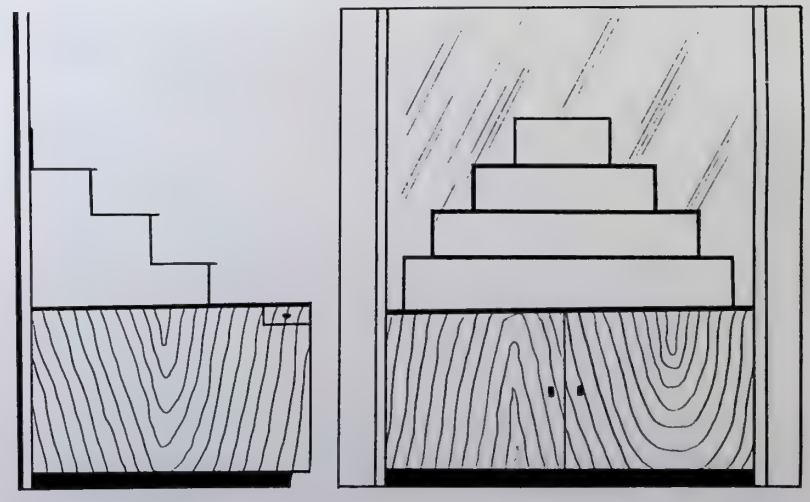
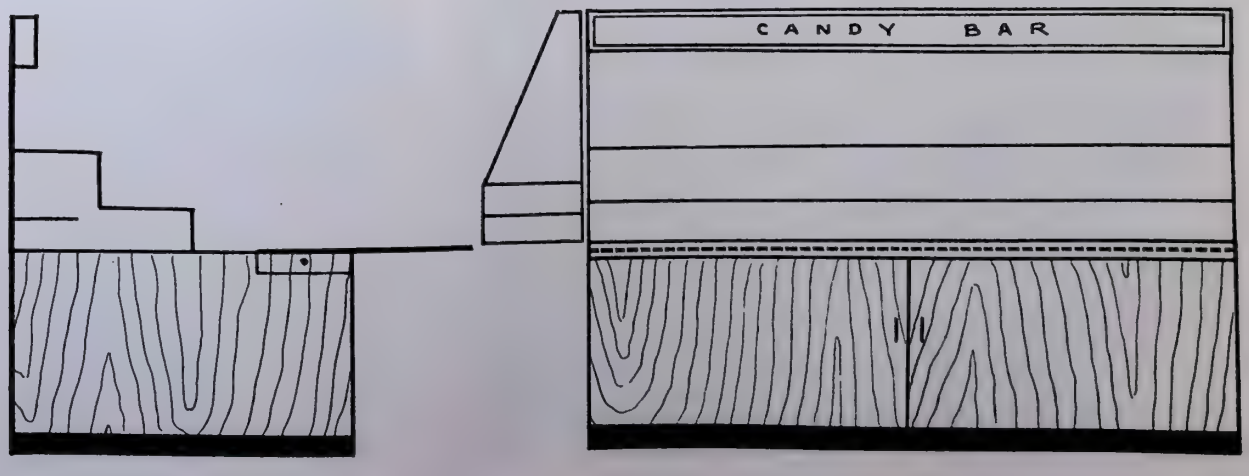


FIGURE 6 (right)—Another effective display is illustrated here. It is pyramidal in form, from 6 to 8 feet in height, and of variable widths. It is backed by a mirror, and lighted by indirect tubing behind the chrome side trim, which naturally shows off the merchandise on the stand to greater advantage. The most important factor in maintaining the attractiveness and inviting appearance of any candy display is that of cleanliness. Always keep all displays clean!

FIGURE 7 (below)—The use of the counter on either or both ends of wings which open out into additional display shelves, and the use of a hinged front which can be let down in order to provide increased counter space, lends not only added efficiency but the ability to close the display and lock it at night. All of the drawings in Figures 3, 4, and 5 are for use in front operation only, so that the shelf-equipped storage cabinet must most conveniently open from the front.



The Sanitary Codes Apply to Theatre Sales

The Laws on Sanitation and Public Health Briefly Summarized in Regard to Theatres

SAMUEL L. LOWE
President, Theatre Candy Company, and Editorial Consultant to EXTRA PROFITS

Although the sanitation and food and drug laws of each individual city and state vary to some degree, in general their provision with respect to the retailer follow the same line of reasoning, precaution, and enforcement. Public health and sanitation are important, and legal authority for each city and state to safeguard the public in this connection is customary, and only proper.

To prevent the spread of communicable diseases, and to preserve proper unadulteration and wholesomeness of food are the chief aims. Consequently, supervision begins at the manufacturing source, and follows the product through all channels until it ultimately reaches the safeguarded consumer.

Assuming that the theatre retailer relies upon others for the proper preparation, labeling, and primary sanitation of the products supplied him for resale, how do these public health laws apply to him?

As the sanitary food law of one state says, "Food shall include all articles used for food, drink, confectionery, or condiment, whether simple, mixed, or compound, and all other substances and ingredients used in the preparation thereof." Thus, the sale of candy, popcorn, ice cream, and soft drinks by the theatre falls under these laws, and must comply with them.

Since these laws forbid unsanitary conditions in connection with food, conditions which are forbidden must not be allowed to exist in the retail sale of candy, popcorn, ice cream, and soft drinks in the theatre. What conditions are deemed unsatisfactory by one state follow: "Unclean, unhealthful, or unsanitary conditions or practices shall be deemed to exist if the floors, sidewalks, and ceilings are not properly constructed and maintained; or if food in the process of production, storage, sales, or distribution is unnecessarily exposed to flies, dust, or dirt, or to the products of decomposition or fermentation incident to such production, storage, sale, or distribution; or if any person is permitted to use as a sleeping room any place where food is prepared for sale, stored, served, or sold; or if any employer shall knowingly permit or suffer any person who is affected with tuberculosis or any other communicable disease to work in such place, or if there is any other condition or practice which endangers the wholesomeness of food."

Since state laws usually provide for inspection and regulation of food sanitation, the theatre as purveyor of such items is subject to the power and authority of these inspectors and health agents.

Now that it is definitely established that the theatre falls within the scope of state and city regulations, what are some of the regulations that must be complied with? The following are examples from the requirements of various cities and states, and are by no means inclusive, though indicative of general thinking along these lines.

"Places in which food is handled or stored shall be kept free at all times from roaches, rats, mice, and other vermin. Metal garbage and rubbish cans shall be provided, which shall be kept covered at all times, shall be emptied and cleansed daily, and the contents, and any other rubbish or refuse matter, so disposed of as not to create a nuisance or to afford a breeding place for insects or rodents."

"All persons engaged in food-handling shall, before commencing work, and following every use of the toilet, wash their hands. The clothing and persons of such employes shall be clean."

"That every person engaged in the business of producing, storing, delivering, offering for sale, selling, or distributing foods and beverages shall provide in connection with such business an adequate and convenient supply of running hot and cold water and all other adequate and convenient facilities, including towels, necessary for the thorough cleansing of the premises, and of all the equipment, utensils and receptacles, which hands, equipment, utensils, and receptacles may come into direct contact with such food and beverages or with ingredients used in the preparation thereof, in the course of the business."

"All refuse, dirt, and waste products subject to decomposition shall be removed daily, and all trucks, trays, boxes, baskets, cans, and other receptacles, chutes, platforms, racks, tables, shelves, and all knives, saws, cleavers, dippers, ladles, and other utensils and machinery used in connection with the preparation or handling of food shall be maintained at all times in a cleanly condition."

"No person afflicted with tuberculosis (consumption), typhoid (convalescent or 'carrier'), venereal disease, diptheria, scarlet fever, measles, mumps, or with any other communicable disease shall be permitted to work in any place where food is produced or distributed."

In dispensing drinks, carbonated or uncarbonated, at open stands, "Dipping from tanks, bowls, tubs, crocks, or other containers is prohibited."

"When bottled foods or beverages are placed in water for cooling, the tops of such bottles shall not be submerged."

"Whoever, by himself, his servant, or as agent of any other person or corporation, manufactures for sale, or knowingly sells or offers for sale any candy adulterated by the admixture of terra alba, barytes, talc, or any other mineral or metallic substance, or by poisonous colors or flavors, or containing brandy, whiskey, rum, wine, or any alcoholic liquor in liquid form, or other ingredients deleterious or detrimental to health, or offers for sale any candy under the name of brandy, whiskey, rum, or wine drops, shall be punished by a fine of not less than $50, nor more than $100."

"Whoever sells or offers for sale prize candy in packages containing or purporting to contain a prize or gift shall, for each offense, be punished by a fine of not more than $20, or by imprisonment for not more than 30 days; and, if discovered in the commission of such offense in any railroad-car, steamboat, public conveyance, or other place by any officer qualified to serve criminal process, he may be arrested by such officer, and detained by imprisonment or otherwise for not more than 24 hours, until a complaint has been made, and a warrant issued against him."

In some cities, it is necessary to obtain a Sunday sales license if sales are made inside the theatre on Sunday.

All candies and edibles must be properly wrapped, as no food is allowed to be handled to prevent contamination. One state covers this point by stating that "confectionery should be protected by glass or other dustproof cover."

"The commissioner of public health, on his own initiative or at the request of a local board of health, may require any person working in an establishment engaged wholly or in part in the business of producing, manufacturing, processing, storing, or offering for sale any article of food, and whose duties actually involve the handling of food during such production, manufacture, processing, storing, or offering or exposing for sale, to submit to thorough examination by the department of public health (hereinafter called the department), or by the local board of health, if said commissioner has reason to believe that the examination of such person is necessary for the protection of the public health, to ascertain whether or not he is afflicted with any contagious, infectious or other disease or physical ailment which might render such employment detrimental to the public health, and whether or not, in the opinion of the department, he is a carrier, so called, of such a disease."

* * *

From the foregoing regulations, it is obvious that the theatre retailer, wherever he may be, must be on his toes against dirt and disease in connection with his sale of candy, popcorn, drinks, and ice cream.

And do not forget that this care in connection with sanitation pays off in still another way, in increased sales through increased eye appeal and consumer acceptance.

Review of the Types of Popcorn Seasoning

Hard and Liquid Seasoning and Salt Lead To the Discussion of Points for Poppers

J. A. Ryan
Vice-President, C. F. Simonin's Sons, Inc.

The years of the war brought into bold relief the fact that most of the popcorn consumed in this country is cooked in oil or fat of some kind. A substantial portion is sugar-coated, or caramelized, some of this being cooked in oil first; also, a fair quantity is "dry-popped," to be sprayed afterward with butter or flavored cooking oil. All of the popcorn treated with oil in some fashion or other came to be known as "seasoned" corn, and the oil or fat used is called "popcorn seasoning."

Why seasoning for popcorn? And why is the fat used for this purpose called "seasoning"? A moment's consideration will recall to our mind that fat, as a medium for cooking, or as oil in salads, has a far broader function than providing a diet component.

Generally speaking, ample fat for dietary needs is present naturally in most foods, especially meats, cereals, nuts and fish. It is as a true seasoning agent, however, that most oils and fats are used in the average household and restaurant. The well deserved reputation of French and Italian chefs is based to a large extent on their skillful use of oils, such as olive oil and peanut oil, in the preparation of their incomparable dishes and salads. Here in America, fat pork in beans lends savor to the food, while butter on hot vegetables or breads is a sine qua non to the full enjoyment of the meal.

It is important to our subject, however, to note that the flavor of the fat used is actually secondary to its seasoning qualities; it is the oil or fat itself that seasons the food in which it is cooked. This fact is so well known that it is taken for granted. Yet, concededly, fat itself is seldom, if ever, called seasoning—except where popcorn is concerned—and here it is appropriately known as "popcorn seasoning."

TYPES OF POPCORN SEASONING

Having defined popcorn seasoning, it is pertinent to discuss the various kinds and types of oils and fats available for this purpose. As far as the average theatre owner or small corn popper is concerned, they fall generally into two types, that is, hard and liquid.

The hard fats include those of animal origin, such as beef fat, tallow, or lard; the hydrogenated vegetable oils, sold under well-known trade names; and the naturally hard vegetable oils, such as coconut oil.

It should be explained that, for the most part, the hydrogenated oils are usually domestic liquid vegetable oils, hardened by an interesting but simple process through the use of hydrogen gas in the presence of a catalyst, which makes them available as shortening in the making of cakes and pies, as well as for other cooking purposes. Labels describing these fats usually state "all hydrogenated vegetable oils," "hardened vegetable oils," or other similar declarations. It is not uncommon for manuacturers of animal fats to hydrogenate their products; but, generally speaking, the animal fats provide in their natural form the necessary degree of hardness.

The liquid vegetable oils available for popcorn seasoning are mostly of domestic origin. They include oil derived from peanuts, cottonseed, corn, and soybeans. The bracketing of these oils in the same category does not mean that they are all of equal value for the purpose. As in the case of hard oils they are mentioned to draw the line generally between hard and liquid seasonings. All, however, are well known food oils, sold under reputable trade names and are of approximately equal food value. Their relative desirability as popcorn seasoning will be discussed later.

RELATIVE MERITS OF TYPES

Hard Seasoning

Coconut Oil. Prior to the recent war, coconut oil almost exclusively was used for seasoning popcorn. It possessed definite advantages in good keeping qualities, did not gum or blacken the popping kettle, was neutral in flavor and odor, and in general gave good satisfaction.

During the war, coconut oil was forbidden by the government to be used for edible purposes because of greater need in the manufacture of munitions. The development of other war-time popcorn seasonings of domestic origin revealed the disadvantage of reliance on an imported product and also brought to the consumer greater flexibility in his operations through the use of other types.

While coconut oil will again be available with the return of normal international trade, it has already become evident that other oils and fats, both hard and liquid, will give equal, if not greater satisfaction.

Animal Fats. Beef fat, tallow and lard—all these are wholesome food fats, and were used to a greater or less extent during the late war.

In general, they suffered in public esteem because of their characteristic flavor and odor, which often caused annoyance in public places, such as theatres and stores, where the odor permeated the atmosphere and was removed with difficulty, if at all, from expensive carpets and hangings. It is not believed they will find a permanent place as popcorn seasoning.

Hydrogenated Vegetable Oils. Under well-known trade names, but commonly known as shortening, these fats filled a

AS THE YEARS ROLL BY, the selling of popcorn in theatres becomes more widespread, with as many ideas on the placement of the popper as there are designers to make them. Here is the idea as set forth at the Grand Theatre, Taunton, Massachusetts. But no matter the placement of the machinery, the flavor of the product is the important thing—and the seasoning used is, perhaps, the most important factor in providing the fullest flavor.

definite need among corn poppers. Usually highly refined and well deodorized, and easily available in all parts of the country, the hydrogenated vegetable oils are destined to take a definite place in the industry.

The fact, however, that they are hard oils and require pre-heating to the liquid state before use should be borne in mind. Many post-war models of popping machines are equipped with special pre-heating units, some of them with reservoirs which hold the fat in liquid form and feed it automatically to the popper. Care should be taken to drain out the equipment at the end of the day's operations to avoid trouble the following day.

Where pre-heating equipment is not available, and the fat must be applied to the popper with a scoop or paddle, accurate measurement of the fat is difficult and economical results cannot be expected.

Liquid Seasoning

Within certain limitations, liquid vegetable oil of the right type, when properly refined and prepared for corn popping, undoubtedly offers the theatre owner the ideal popcorn seasoning.

Among those mentioned above, peanut oil evidently best serves the purpose. Because of its non-drying quality, it is less likely to gum or blacken the kettle than cottonseed or corn oil, and it does not "revert," that is, take on the fishy flavor and odor of soybean oil.

A popular brand of peanut oil, artificially flavored and colored at the refinery, is currently giving excellent satisfaction throughout the country. Packed in a handy small container, easily stored at the machine, and convenient to use, this product seems to answer all the needs of the individual corn popping operation.

Reservoirs for automatic feeding are easily filled, while old-type machines are readily served by the time-honored pitcher and measuring cup. Soon to be introduced to the market is a smaller can, filled at the refinery, which will do away with the pitcher, so long thought to be a necessity, and leaving only the measuring cup for accurate and economical operations.

It is well known that the correct amount of seasoning—neither too much nor too little—is important to the best results, not only with respect to the flavor and appearance of the popped corn, but also because of cost.

Seasoning is the most expensive ingredient of all. The price one pays for it initially is the least consideration. If the seasoning, hard or liquid, be used incorrectly, good quality popping corn may be ruined and costs unnecessarily increased. It was for this reason, primarily, that several popcorn machine manufacturers, in developing their post-war models, provided automatic feeds which would guarantee the correct quantity of seasoning for each popping.

If too little seasoning be used, the corn will be burned, and very little will pop. If too much be used, the finished popcorn will be soggy, and fat will remain in the kettle to gum or blacken it in a short time, thus requiring frequent cleaning.

The correct amount of seasoning (unless local preference dictates a larger quantity) is 25 per cent by weight of the corn to be popped at one time. If 12 ounces of raw corn be used, not more than 3 ounces of oil are required.

During cold weather even liquid seasoning is likely to harden slightly, a condition common to all vegetable oils. This can be avoided by keeping a supply at room temperature in a convenient place. If this be done, the oil should be liquid when popping operations are begun.

THE USE OF SALT

Until recently it was not known how important the right kind of salt is to good corn popping operations. Salt is taken for granted by most of us. Coarse or fine? Pure or impure? What is the difference? There is a vast difference! Most people like the slight savor of salt in popcorn. What many do not realize is that salt of the proper type accentuates the natural flavor of the corn also, somewhat the same as it does with other foods, notably fruits and vegetables.

This problem engaged the attention of chemists employed by the large salt manufacturers. They found that coarse salt, produced by grinding, was not as good for popcorn as the fine, tiny natural crystals of salt, which spread more evenly over the popcorn. This special salt, called "popcorn salt," is made solely for the purpose and accentuates not only the natural flavor of the popcorn, but also of the seasoning.

POINTS FOR POPPERS

Assuming a good grade of popping corn with an expansion and moisture content guaranteed by the supplier, the following procedure, if followed rigidly by the operator, will assure excellent popcorn at lowest final cost.

(1) Heat the kettle to the proper operating temperature.

(2) Measure the seasoning accurately, and pour it into the kettle.

(3) Wait for the seasoning to smoke. If the kettle be hot, this will occur by the time the corn is ready for the kettle. If the seasoning be not hot enough, it will be absorbed by the corn, preventing complete popping and making soggy popcorn, also wasting the oil.

(4) Measure the corn accurately, mixing the salt with it before pouring both into the kettle.

Seasoning has a two-fold purpose in cooking popcorn: it flavors the corn and also provides a seal for the moisture in the corn. The correct amount of seasoning will provide just enough to surround each kernel with hot oil and seal in the moisture. The explosion of the kernel against the heat seal provides the maximum size of the popped kernel and the even dispersion of flavored seasoning and salt throughout the mass.

Corn poppers should not be deluded by the price they pay for their ingredients. Good corn of guaranteed moisture and popping volume, sold by a reliable dealer, is not as cheap as mere corn sold for so much per bag. Popcorn salt, especially prepared by the manufacturer, costs more than common salt. Seasoning that is properly refined, flavored, and colored at the refinery, and packed into handy containers for use at the machine, is more costly than bulk fat that must be melted in expensive equipment and used wastefully.

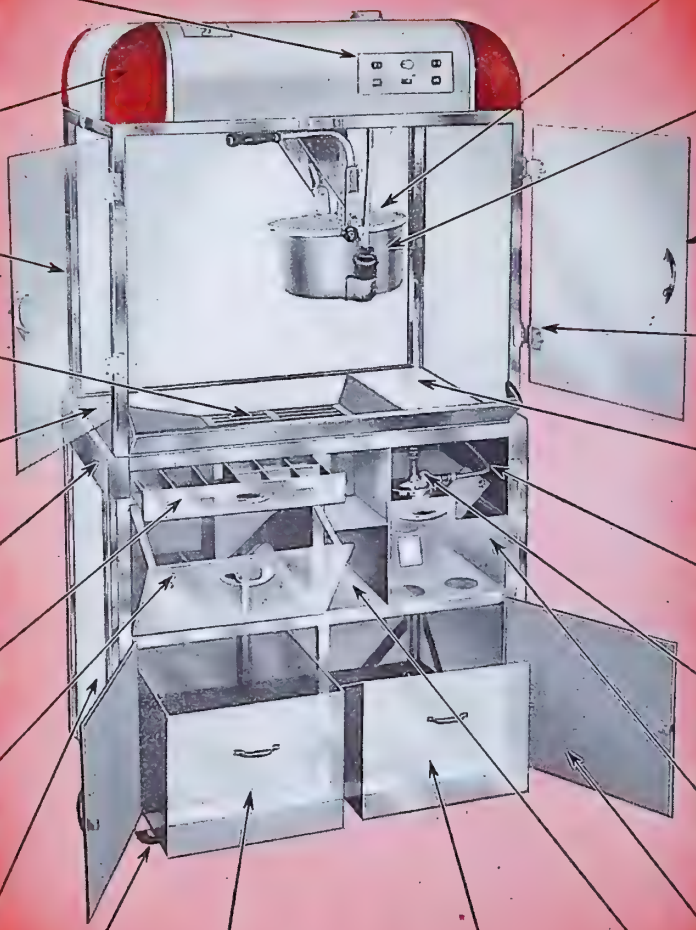
As any business man knows, it is the final profit available after the operation that really counts. In the final analysis, good corn, good salt, and good seasoning—all properly used—will best assure this result.

ACCURATELY MEASURING THE SEASONING, while but the second Point for Poppers, is yet of paramount importance; for, on using the correct amount depends the best possible results and the greatest amount of flavor in the final product; and, naturally, it is these factors on which the successful merchandising of popcorn is based. In the final analysis, good corn, good salt, and good seasoning—all properly used—will best assure this popping result.

BEFORE you design a new theatre or redesign your present house, consult Berlo Vending Co. on lobby sales. 20 years' experience, plus a complete organization for installing, operating and maintaining every kind of lobby sales set-up, make Berlo's aid invaluable to you. Write or call us today.

BERLO VENDING CO., 333 S. Broad St., Phila. 7, Pa.

Only the *Manley* Popcorn Machine has all these Money-Making Advantages!



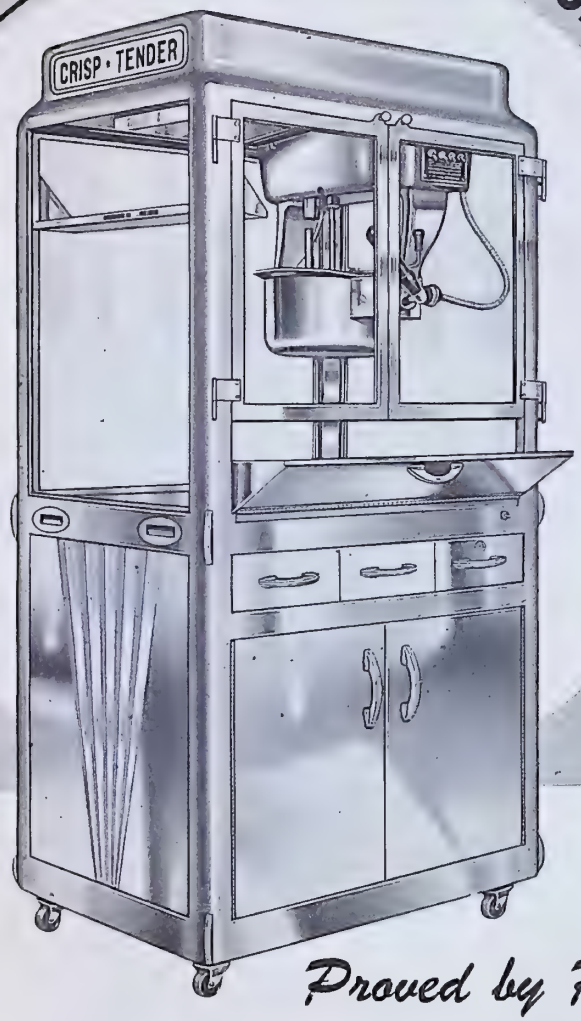
- Pilot Light
- Plexiglas illuminated, colored panel has arresting eye appeal.
- Electrically welded, all aluminum frame, light but strong.
- Heavy corn screen.
- Heavy ¼ inch, plate glass windows on front and sides.
- Side trim highly polished, heavy cast aluminum.
- Cash drawer with 6 coin and 3 bill tills.
- Corn bin with curved, slotted bottom so any chaff will drop through to old maid bin below.
- Side and front panels of heavy, stainless porcelain on vitreous enameling steel.
- Kettle lid has bayonet slots for easy removability.
- Precision-built Tip-T-Matic, thermostatically controlled, Kettle, scientifically balanced with new safety and popping features.
- Unbreakable, heavy plexiglas doors.
- Special hinges allow doors to swing back against sides.
- Warming pan for popped corn and packaged corn, keeping it hot.
- Flexible seasoning tube that carries oil without fuss or muss.
- Seas-O-Matic Pump governs the correct amount of seasoning in kettle.
- Seasoning well with 25 lb. capacity, easily accessible for refilling and cleaning.
- Utility doors reinforced with sheet steel and equipped with piano hinges for easy action.
- Rubber-tired, ball-bearing, heavy duty swivel castors.
- Old maid bin with one bushel capacity.
- Storage bin with sliding shelf accommodating 50 lb. can of seasoning.
- Storage space for empty bags and boxes.

For Complete Information Write

MANLEY, INC.

1920 WYANDOTTE STREET KANSAS CITY 8, MO.

4125 POSTWAR STAR MACHINES IN OPERATION



The "Super Star" THEATRE MODEL

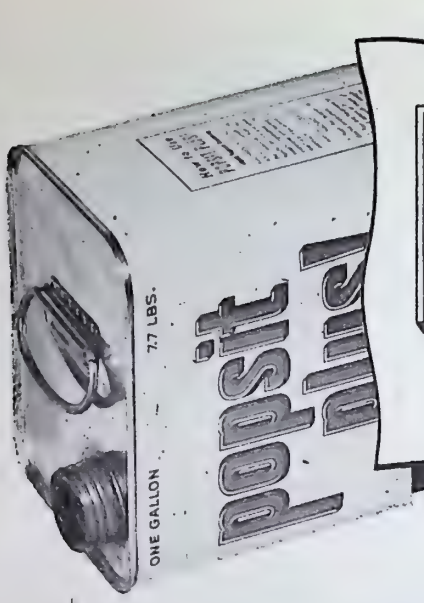
Proved by Performance

Join the thousands of popcorn machine operators who have found the answer to increased profits in this new, modern STAR POPCORN EQUIPMENT. From coast to coast, exhibitors have proved that the "Super Star" builds popcorn receipts . . . gives trouble-free, dependable service . . . and can be *counted on* to handle those rush periods. Built especially for use in theatres, the "Super Star" is simply designed for ease of operation and cleaning—beautifully styled to be a decorative asset to your lobby.

Popcorn profits are tremendous. Make the most of them by using the machine that was designed *to meet your particular requirements.* Investigate the "Super Star" today. *You can pay more, but you can't buy a better popcorn machine.*

PRICED AT ONLY $589.00

STAR MANUFACTURING CO., Inc. 6300 ST. LOUIS AVE. ST. LOUIS 20, MO.



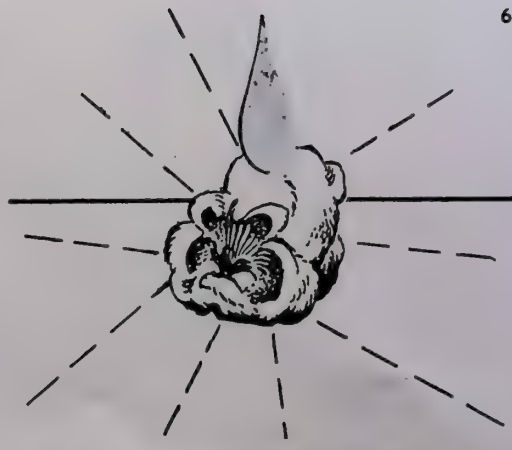
popsit plus!

The LIQUID popcorn seasoning with that BETTER flavor

Yes . . . POPSIT PLUS has everything!

1. It pops more corn because every drop is used.
2. When kept at room temperature it pours easily, which means accurate measurement in every popping.
3. It increases volume expansion since every kernel of corn is covered with oil.
4. No time consuming extra-cost melting is necessary.
5. Attendants like its convenient packaging — there is no heavy lifting and it is readily stored at the machine.
6. It is scientifically prepared from choice American peanut oil, flavored and colored at the refinery under laboratory control — this guarantees uniformly delicious popcorn.

To be sure of those extra profits, demand the complete, ready-to-use seasoning with the "nose and eye" appeal . . . POPSIT PLUS!



C. F. Simonin's Sons, Inc.

Refiners

ESTABLISHED 1876

3500 N. BELGRADE ST. PHILADELPHIA 34, PA.

SEASONING SPECIALISTS TO THE NATION

SECTION 3-G

PERSONNEL TRAINING

1946-47

Work of a Theatre Manager Is Never Done!

Small Theatre or Large, the Work Goes On, As Is Revealed in Two Sets of Photographs

Headlines of the motion-picture industry generally go to stars, big premieres, and terrific grosses so often that, at times, one loses sight of the fact that a major strength of the industry throughout these United States lies in thousands of houses in little towns and hamlets which go through a daily job of entertaining people without any fanfare or publicity. It was with this in mind that a photographer was sent to a small town to record an ordinary day in the lives of two managers. His reports follow.

The captions beneath the photographs on these two pages tell better than anything else what managers' problems are.

The story of Albert R. Sanders, manager of the Playhouse Hicksville, New York, for the Prudential and Playhouses Operating Company, also brings the readers, especially those in the smaller towns, specific information on some of the things he does in connection with his operation of this 1006-seat house in a town of 8000 population about 25 miles from New York.

TWENTY-FIVE MILES FROM BROADWAY

Just about an hour's ride from Pennsylvania Station, New York, aboard the Long Island Railroad, is the town of Hicksville, New York, with 8,000 residents, to be exact. Pride and joy, cinematically, of Hicksville is the Prudential and Playhouses Operating Company's Playhouse, on East Marie Street, a 1,006-seater, which changes bill thrice weekly, plays all product, and follows seven days after Hempstead, New York. Average gross, as near as can be ascertained, hovers around the $2,000 mark, although during boom times, when nearby war industries were in full swing, it was undoubtedly greater.

Managing the Playhouse is Albert R. Sanders, who once did publicity for the Shuberts, produced some shows ("one a hit, the others flops"), and finally decided to settle down to handle a theatre. Just what happened in a typical day to Manager Sanders and probably hundreds of others like him in the business,

ON EAST MARIE STREET, in Hicksville, Long Island, New York, stands the Playhouse, a Prudential and Playhouses Operating Company 1,006-seat cinema serving the city's 8,000 residents. Managing the Playhouse is Albert R. Sanders, who once did publicity for the Shuberts, produced some shows himself, and finally settled down to handle a theatre. Just what happened in a typical day to Manager Sanders—and, probably, to hundreds of others like him in the business—is set forth in words and pictures in these pages, with a supplemental discussion of the Playhouse's Birthday Club. A wide variety of activities—some theatrical, some not—is shown.

"JANITOR-HANDYMAN HARRY SMITH was talking over the cleaning woman shortage problem with manager Sanders. The war salaries paid at the Grumman factory nearby caused former cleaning women to earn more money than they could at the theatre, with the chance of getting a part-time cleaning woman remote."

"HERE SANDERS was also having some troubles with the local odd job repairman. The point in question was the repair to the door latch by the repairman, who carpenters, does plumbing, and anything else around town. The exit lock wasn't fixed, and Sanders told him that he'd better tend to it or else pay back money."

are noted in these pages.

A most common complaint of many a small-town theatre, particularly in areas where war industries abounded during the war, was that it was impossible to get and keep help for tasks about the theatre as cleaning and maintenance, and service duties such as ushering and cashiering, and the like. Result was that many a small-town manager (and his big brothers in the large cities had the same troubles) found himself performing any or all of these duties at various times.

The situation has not been alleviated to any great extent by the end of the war, primarily because of the fact that theatre wages for this sort of work in the smaller cities have always been low, principally because they are on a part-time basis.

Anyway, the result has been that Sanders, like many other managers, never knows when he gets up in the morning what additional duties he will have to perform, but regardless of his problems is always ready to pitch in to do his bit, and it is to the credit of the managers everywhere that they were able to keep going as they did during World War II.

The Playhouse is on a continuous performance schedule from 2 to 11:30 P. M., which is not a common policy in towns of about 8,000 population, but it may be attributed to the fact that when the war was on, Hicksville was in the center of a group of war plants, which worked three shifts a day.

As Sanders indicates, "During the war, anything went, but since V-J Day, with about a third of the war employes working, it is a different story."

Surprisingly, however, business has not fallen off as much as was anticipated, which Sanders attributes to honesty in advertising to a large degree.

Basis of strength of theatres in many small town communities is the opportunity to build good will, in becoming a definite part of the community through contacts with civic organizations, schools, fraternal groups, and so forth. The theatre is not only a citadel of en-

"DOORMAN ARTHUR WALLENHAUPT got his instructions from Manager Sanders, who covered everything from 'get a gallon of alcohol, some razor blades, and squeegee those front door glasses; that paint has to come off' to 'the feature ends at 11:32 p. m.' Meanwhile, Handyman Smith kept busy at his cleaning."

"THIS SHOT ISN'T FAKED. When I got to Hicksville, Manager Albert R. Sanders was actually cleaning the lobby of his theatre because he and Handyman Harry Smith were the staff for the morning. Smith was cleaning the theatre in general. Incidentally, the regular vacuum sweeper was being given some needed repairs."

"BECAUSE PROJECTIONST JOHN VITALI had a breakdown with his car on his way to the theatre, manager Sanders didn't have too much time to go over the show, which went on two minutes later. Vitali had called in, however, so Sanders would not worry too much. Things were due to begin at 2 p. m., and Vitali made it."

"JUST BEFORE THE BOX OFFICE OPENED, Sanders told cashier Hazel Munch about an incident in which a man claimed that on the day before he had given the cashier a $5 bill, and had received change for only $1. Sanders, however, had told him that the receipts of the day before had come out correct to the cent."

tertainment in such places but an important force in everything that goes on.

That Manager Sanders has found this one of the important principles of operation in Hicksville is evident by his many tie-ups and his participation in community life.

As he says, "I have brought this theatre to the spot it holds today through honest and truthful advertising, being a good hand shaker, and meeting my patrons as they come and go. In other words, in my opinion, a small town manager must be a diplomat, and all the tie-ups and exploitation in small towns do not mean a thing unless, when it is over, the patron is satisfied.

"Otherwise, what one might gain on one over-selling job will react on future business, as we have no floating population, and the patron of today is the same one on the next change of pictures."

Pride and joy of Sanders' publicity, advertising, and exploitation is his Birthday Club, which works as follows:

Each member of the club has a card recording the date of birth, month, year, together with name, street, town, and school, and each child receives a button indicating membership.

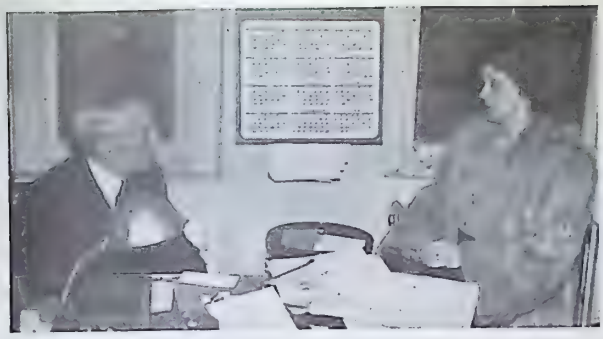
After the club is running for a month or so, the youngsters elect their own president and vice-president, and they handle the meetings, and so forth. Cakes are given by the officers to those who have their birthdays during the week, and the officers also make a little talk arranged for them by Sanders. The children thus feel that this is their club, and that they are running it. In addition to the regular program, extra cartoons or a western are often booked, in which case this is emphasized so that the members will know that everything is being done for their benefit.

Trailers advertising the club in advance are not especially good, as many of the children often can't read. A personal talk is necessary before they can tell what it is all about, and it is also advisable to give little talks from time to time on special matters.

In the case of the baker who provides the cakes, he should be asked to

"WITH THE SCHEDULE lasting from 2 to 11:32 p. m., it made a long day of it, and when Manager Sanders closed the house for the night he knew very well that he, like so many other small town managers throughout the country, had not only put in a full day but had helped make lots of people of the locality happy."

"SANDERS STOOD BY THE DOORMAN, generally kept an eye on things when the house opened for the matinee. On Thursday matinee, he is his own doorman, but he expects to get some local high school boys as ushers and assistant doorman. The inducement of a uniform may prove to be the deciding factor."



PRIDE AND JOY of Manager Albert J. Sanders is his Birthday Club, and here he explains its workings to Mrs. Franklin L. Durek, Parent-Teachers Association president. When she deplored lack of interest in the PTA locally, Sanders offered complete cooperation in building interest in the organization and raising funds.

DRUGGIST FRED EBERHARDT, running one of the most progressive stores of its kind in Hicksville, is active in local Kiwanis Club affairs, and often makes tieups with the Playhouse on current pictures. By keeping contact with the civic organizations, Sanders is able to build much good will for the Playhouse in Hicksville.

furnish as many as are needed for a definite period of time. He gets in return a 40 x 60 in the lobby giving him a plug, and every Saturday the bakery is mentioned in the weekly talk.

The theatre buys the buttons and membership cards, with the total cost running about 50 to 60 cents a week.

Membership in the club is limited to those under 12. The buttons make the children walking advertisements, and the birthday data is valuable for possible use when the children become adults for mailing lists, and the like.

As far as other advertising and exploitation angles are concerned, Sanders uses the weekly Center Island News, window cards, a mailing list of 1,500, postcards on factory bulletin boards or plans publicity in factory newspapers, makes tieups with stores, schools, organizations, or churches, as the case may be; has a weekly newspaper cost of from $15 to $30, gets newspaper cooperation, uses programs and window cards, but does not touch the radio.

His house changes bills three times weekly, with pictures playing Sunday-Monday-Tuesday, single day, Wednesday, and Thursday-Friday-Saturday. In addition to Hicksville, his drawing area includes other Long Island towns such as Bethpage, Syosset, Jericho, and Westbury, with Farmingdale, Mineola, and Hempstead (first-run) also drawing from the same area.

House plays continuous from 2 to 11:30 P. M.

The Playhouse scale of prices follows:

Children, all times, $.20; adults, matinees, $.35, nights $.50, and adults, holidays and Sundays, matinees, $.40. Prices change at 5 P. M.

Sanders emphasized that each situation is different, and what may be profitable for one spot may not be for another. However, there is valuable material in Sanders's experience for other similar types of operation, and they hope that good use will be made of it.

SANDERS' CAKE GIVEAWAYS, in connection with his Birthday Club, are made possible through the assistance of the Just Rite Bakery, two blocks from the business district. Sanders gives the bakery an advertising boost, and Herman Price, the baker, figures that the whole setup is helpful to him, and naturally keeps it up.

THE CENTER ISLAND NEWS is Sanders's principal advertising medium. When he calls on Editor Fred J. Noeth and Editorial Assistant Mary Haughey they welcome him as a progressive manager. Sanders realizes that by cementing a good newspaper-theatre relationship, it can prove advantageous in plenty of different ways.

AS IN ANY SMALL TOWN, cooperation with the schools may be made an asset, with Hicksville schools superintendent, E. H. LaBarron, and Hicksville High School principal, Mabel R. Farley, here being told of the historical significance of "Northwest Mounted Police," which was soon to get playing time at the theatre.

IN THE LOBBY of the Playhouse stands this display plugging the Birthday Club, and asking youngsters to register their birthday. Doorman Arthur Wallenhaupt has been at the Playhouse for 17 years, and knows everyone, although the war brought some occasional "strangers" to the town because of the new industries.

LEWIS S. BLACK, manager of the Warner Theatre, in Wilmington, Delaware, and city manager for the Stanley-Warner activities in the Blue Hen's metropolis. The Warner Theatre has a seating capacity of 1,761, as against comparable first-run opposition aggregating 2,500 seats. Throughout this presentation of Manager Black's manifold activities is a thread of continuity not unlike that of the discussion of Albert R. Sanders and Hicksville's Playhouse, with the differences being attributable to the 140,000 Wilmington souls as against the 8,000 in the Long Island city. But, from whatever angle, the work of a theatre manager is never done!

THE WARNER THEATRE, Wilmington, Delaware, is the center of this pictorial discussion of managerial activity in an urban center, to be contrasted with that in the small city of Hicksville just described above.

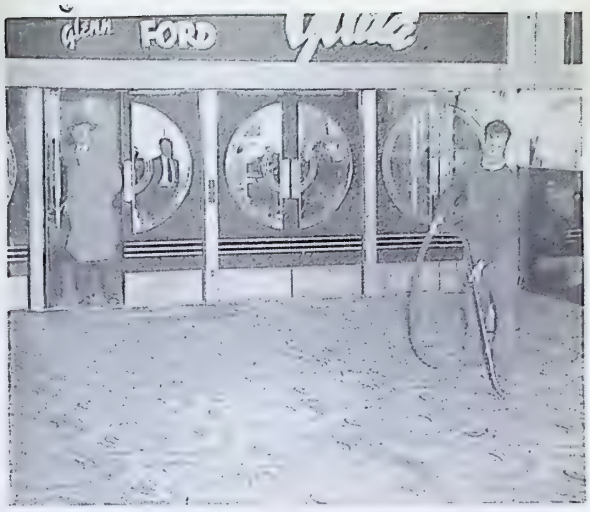
THINGS ARE BUSTLING IN WILMINGTON

To follow up on this Hicksville story, this time to feature the manager in a bigger city, the photographer traveled to Wilmington, Delaware, to focus his lenses on Lewis S. Black, manager of the first-run Warner theatre, and city manager of the Warner Brothers theatres that serve this population of 140,000.

Operation of the houses in Hicksville and Wilmington necessarily are different, of course, but in both spots the manager's job is not an easy one, and requires experience, talent, and work.

The Warner has a seating capacity of 1,761, and it has a two A first-run competitors, with an aggregate seating capacity of 2,500. This obviously keeps Manager Black and his staff constantly on their toes.

The advertising media Black uses are all reliable, and have been proved time and again to be effective. They include heralds, which are used rather irregularly; commercial tieups; institutional tieups with schools, organizations, and churches, depending on the type of show; window cards occasionally, and, of course, radio and newspapers. At various intervals kiddie programs are held to help boost up box-office grosses. The net result of all this is good business, with much of the credit going to Manager Black and his aides.

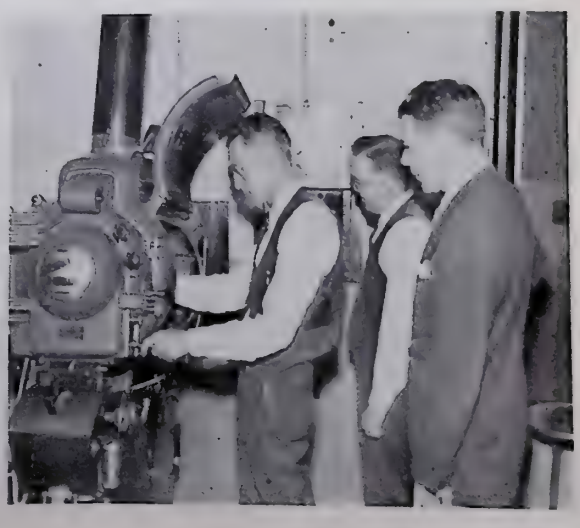


EARLY EACH MORNING, Manager Lewis S. Black arrives at Wilmington's Warner Theatre to get things ready for the day's operation, and greets (above) Frank Smigielski, already working cleaning up the lobby. Later on Frances Stroman and Joseph R. Stuart (below) come in to discuss the exploitation of a coming film.

IN HIS OFFICE (above), Manager Black takes care of the morning's mail, and so leaves himself comparatively free from paper work for the rest of the day. William Brodie, of the theatre's display department, sees Manager Black (below) and shows him for review and approval, newspaper material made up for the week's shows.

A CURTAIN which has gone crooked receives the attention (below) of Black and his assistant, Joseph R. Stuart, and they are joined by the chief electrician who recommends blocks as a remedy. An efficient manager, of course, must know as much as possible of his theatre's furnishings and equipment, no less than of his films.

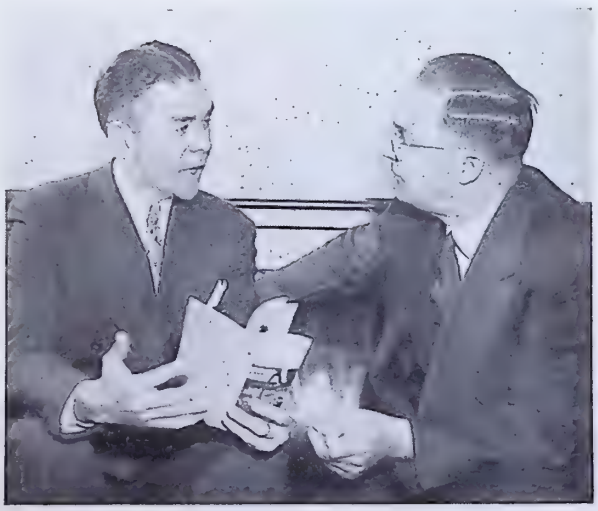
THE PROJECTION ROOM receives a visit from Manager Black (below), who greets the chief projectionist and checks on the situation in the booth. While correction of projection-and-sound difficulties is principally the projectionist's job, the manager and his assistant should be able to explain to him what is wrong at the screen.



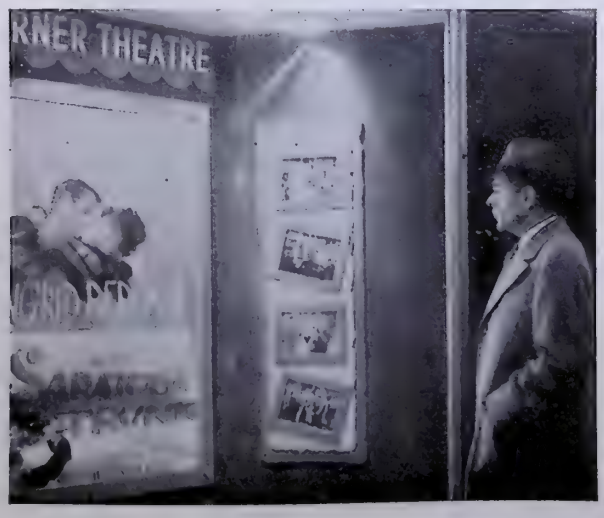
RABBI KRINSKI drops in (above) to chat with Manager Black. The theatre often supplies the Rabbi with passes to be used as awards in a tie-up with a Wilmington Hebrew school. Below shows Manager Black visiting the offices of the Journal-Every Evening for a talk with Helen Barrett, the newspaper's motion picture editor.

RADIO STATION WDEL is visited by Manager Black, who discusses with Gorman Walsh (above) the exploitation of various coming attractions. Black gives Station Manager Walsh an exploitation transcription. Conference is also had (below) with William H. Lemmel, superintendent of schools, on aspects of coming attractions.

AT THE HOTEL DU PONT, Manager Black (below) stops in to check the listing on the hostelry's theatre directory and compliments F. W. Henderson, the hotel's transportation manager, on the appearance of the display. Such a bulletin board is good publicity even though only a picture's title and a column of names are listed.



RETURNING TO THE THEATRE (below), Manager Black looks over the night-lighted advertisement on the theatre property around the corner from the marquee. And thus a full day draws to a close, a day filled with theatre matters, the physical property and equipment, the present show, and details for the attractions coming.



Ex-Servicemen Make Good Theatre Managers

Properly Administered, On-Job Training Is Proving Successful in the Industry

With the cessation of hostilities marking the end of World War II, and the gradual return of our fighting men, many veterans desired to take up training for some sort of specialized work. In this respect, the motion-picture exhibition field was no exception, and, accordingly, many on-the-job training schools for showmen sprang up throughout the country, with the aid of the theatremen and backed by the government. Now, the exhibitor could not only help in reconverting the veterans back to civilian life and occupations, but could also be assured a manager or even projectionist for the future with a knowledge of his business from A to Z.

In some cases, these schools took the form of one student studying at a theatre, as was the case of the Graceville Theatre, Graceville, Florida, where approval was given for the training of a projectionist. Another instance in this type of training was at the Park Treatre, Worcester, Massachusetts, where manager Bill Brown added a serviceman as student assistant manager, with the course approved by the Veterans Administration to run for 18 months. There are also many others.

IN THE LOBBY OF THE DURFEE THEATRE, in Fall River, Massachusetts, William S. Canning, the cinema's manager, shows the shadowbox to his boys, pointing out the ingredient and subtle details of an effective layout in motion-picture advertising. Six one-time servicemen are under the supervision of Nathan Yamins, the theatre's operator, with Canning as the lecturer. The school has been approved by the Commonwealth's Department of Education.

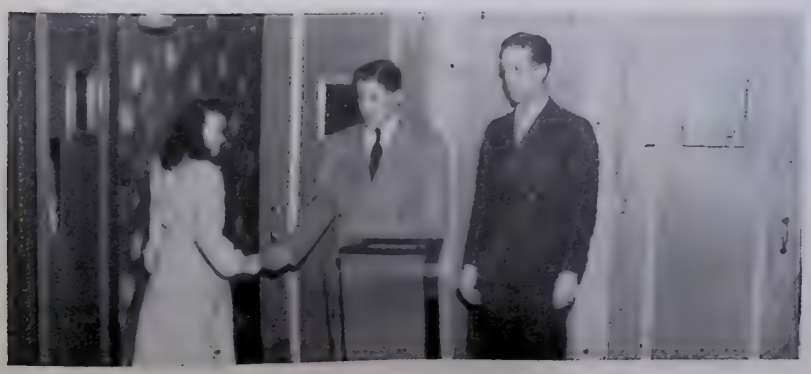
Out in Iowa, Tri-States Theatres Corporation put its training program into operation, a plan which provided for the training of inexperienced ex-servicemen

WILLIAM S. CANNING, manager of the Durfee Theatre in Fall River, Massachusetts, is the lecturer of that theatre's training school for former servicemen desirous of entering the theatre business. Here Manager-Instructor Canning is going over a set of advertising layouts with members of the class. This training school, approved by the Department of Education of the Commonwealth of Massachusetts, is under the supervision of Nathan Yamins. Other theatre schools discussed here in words and pictures are those at the Hope and Avon in Providence, Rhode Island, with yet other instances of theatres offering training in particular branches of activity.

AT THE HOPE THEATRE, in Providence, Rhode Island, the trainee may never have heard of such things as percentage or flat rentals, but these things are taken care of by Manager Samuel Badamo (above). David A. Geddes (below) learns from Manager Badamo the filing system used by the Hope Theatre, a house operated by the Lockwood and Gordon Ente.prises, Inc. Other details of office management are presented in the progress of the course.

INFORMATION OF THE TICKETSELLING SITUATION at the Hope Theatre is given by Manager Badamo to Student Geddes. Immediately below we see them going over details of ticket control, running sequence, methods of control, and all the other details with which every manager must be familiar. Indeed, throughout the course, all aspects of theatres and theatre operation are covered, so that the student is qualified for full managership.

AT THE AVON THEATRE, another Lockwood and Gordon Theatre in the Rhode Island capital, John Murphy is usually used in the capacity of assistant manager, but, at times, he takes over the doorman's position for a short while in order to acquire experience in handling patrons (below). On his successful completion of the training course, Student Murphy was transferred to the managerial spot at the circuit's Opera House in Waterville, Maine.



or former employes wanting to take a refresher course. These students were set to receive 2,000 hours of class room work, the amount required for non-experienced men during the year's period of the course, in addition to the training in the theatres.

As these schools for showmen began to increase, and receive more and more attention from theatremen everywhere, a photographer was sent to Fall River, Massachusetts, and Providence, Rhode Island, where successful and typical training schools for veterans were being conducted, with the results of his visit recorded here.

At Fall River, it was found that a course in theatre management was set up for six former servicemen under the supervision of Nathan Yamins, with his general manager, William S. Canning, as lecturer. Approved by the State Department of Education, the school was considered one of the best in the country, offering a thorough knowledge of all matters pertinent to a successful theatre manager. The Durfee Theatre, in which the veterans trained, was the scene.

One glance at the topics and jobs participated in is sufficient to see that anyone graduated from this school is experienced. They include physical upkeep of the theatre, with a daily inspection of seats, heating, and ventillating equipment, toilets, and so forth; the handling of customers and personnel; taking care of cash; advertising, including newspaper, radio, outdoor, display, and marquee work, and the like; payrolls; statements and reports, daily, weekly, and monthly; management, and booking and running time. There is no doubt about the fact that this program is comprehensive.

An example of the methods of training was the screen test held for the class at the Capitol, Fall River. Pictures, with 15 errors in projection, such as focus, sound, off soundtrack, out of frame, and motorboating, were run off. The students, in their written reports, missed the errors on an average of 20 per cent.

In Providence, the first theatre to be approved by the Veterans Administration and the Rhode Island Board of Education was the Hope Theatre, a Lockwood and Gordon house. Donning spectacles, and playing the role of professor, was Sam Badamo, manager. He submitted a monthly report to the Board of Education on the progress of the men, and the circuit planned to offer the men trained at the Hope positions as managers of its theatres.

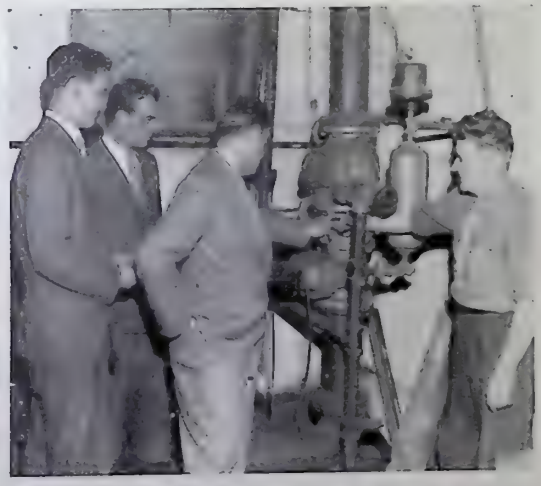
All the trainees in the theatre educational program are paid cooperatively by the theatre and the government under the G.I. Bill of Rights. Thus, with the cooperation of the exhibitor and the government, an additional group of able and thoroughly schooled showmen is assured for the nation's film houses.

As an indication of what happens after a trainee has completed the course with a good rating as well as possession of a thorough knowledge of the various angles of showmanship, it can be pointed out that since these pictures were taken, John Murphy, trainee at the Avon Theatre, Providence, has been advanced to the managerial post at the Lockwood and Gordon Opera House, Waterville, Maine.

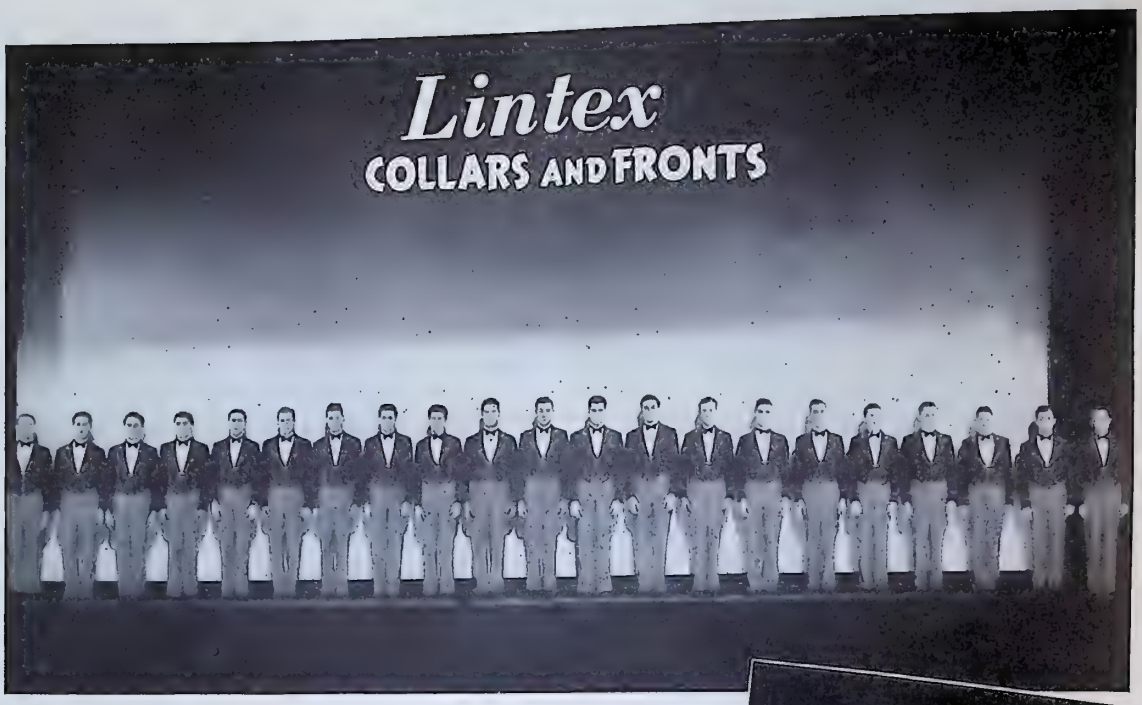
FIRST OF THE CANNING TRAINING PROGRAM is the proper maintenance of the theatre. In the repair and maintenance room (above), the class acquires first-hand information the disassembly and repair of seats. Joseph Patota, maintenance engineer, gives the technical details. The air-conditioning unit is next in line (below), with the ex-servicemen trainees learning all the details. They are not expected to get all their knowledge from this one class, but they will fill in later as they accomplish the duties of a manager. Indeed, here as with other aspects of management, it is familiarity and experience with the details that makes for knowledge.

IN THE BOILER ROOM (above), Joseph Patota, the maintenance engineer, goes over the boiler and heating system, explaining all the details of construction, operation, and maintenance. Although managers may never actually do this work, Canning feels—and rightly—that a knowledge of the working of all items in a theatre is of importance. The class also studies the automatic fire-extinguishing equipment (below). The know-how on the proper operation of these items of equipment, together with a knowledge of their maintenance, is important for managers, so that they may intelligently check for the existence of any faults in the equipment.

AT THE AVON THEATRE, in Providence, Manager Charles R. Darby and Student John Murphy discuss with the cashier some of the problems attendant upon the efficient selling of tickets and handling money in the cage. In the cases described here, the trainees are paid cooperatively by the theatre and the government under the serviceman's Bill of Right. Thus, with the cooperation of the exhibitor and the government, an additional group of able and thoroughly schooled showmen is assured for the motion-picture theatres of the nation. Monthly reports of the students' progress is made to the Board of Education as is required by the rules.



A VISIT TO THE PROJECTION ROOM (bottom) is the next, where the principles of projection—not merely the details of the operation of the equipment itself—is pointed out by Thomas R. Nasser and Joseph M. Epstein, the Durfee s projectionists. While the correction of faults in projection and sound is the particular province of the projectionist, the theatre manager should be familiar with the major troubles, so that he may instantly be able to communicate with the booth and describe accurately what is happening that is not right, leaving it, of course, up to the projectionist to make all of the adjustments to equipment that may be needed.



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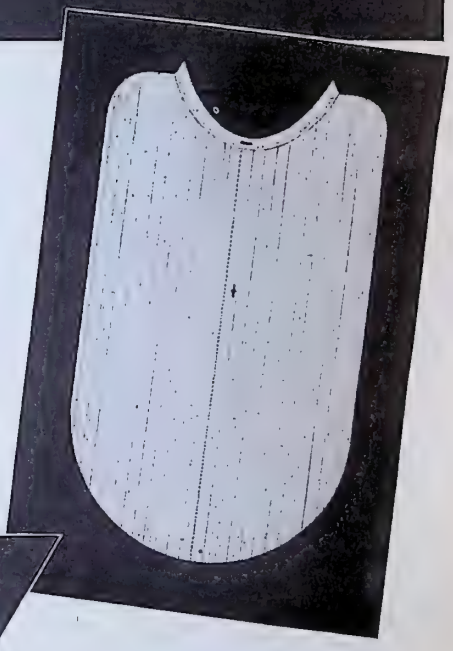

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SECTION 4

FUTURE DEVELOPMENTS

SECTION 4-A
TELEVISION
NBC
1946-47

New Developments in Television Equipment

Review of a Few of the Technical Advances Speeding the Advent of Theatre Television

W. W. Watts
Vice-President in Charge of the Engineering Products Department, RCA Victor Division of the Radio Corporation of America

The first post-war television cameras and other studio and field equipment which make possible an immediate start on the long-heralded expansion of television broadcasting, are now in quantity production and being delivered.

This new television equipment makes it possible for new stations to start now on the installation of facilities to provide television program service throughout the nation. The new Image Orthicon camera was the first post-war television camera to become available. The achievement of quantity output on this equipment was a milestone in television progress.

The first step in the program was to develop and build those items which could be used for testing purposes by manufacturers of television receivers.

Production emphasis was also placed on the new camera and associated monitoring and relay equipment to provide broadcasters with the essentials for starting to train personnel and acquire experience, so that program service could be launched as soon as new broadcast transmitters became available. The first of the post-war television transmitters, featuring important wartime developments in circuits and components, are now being delivered.

The value of the new equipment for commercial television has been demonstrated by its performance in the National Broadcasting Company's telecasts of the Louis-Conn fight, sessions of the United Nations Security Council at Hunter College, and many other events.

IMAGE ORTHICON CAMERA

An outstanding feature of the new camera, aside from its compact construction and portability, is its use of the Image Orthicon pickup tube, with light-sensitivity 100 times greater than that of conventional pickup tubes and approaching that of the human eye. Also incorporated in this camera are numerous improvements in circuits and design which grew out of the experience in building more than 4,000 television cameras for military applications.

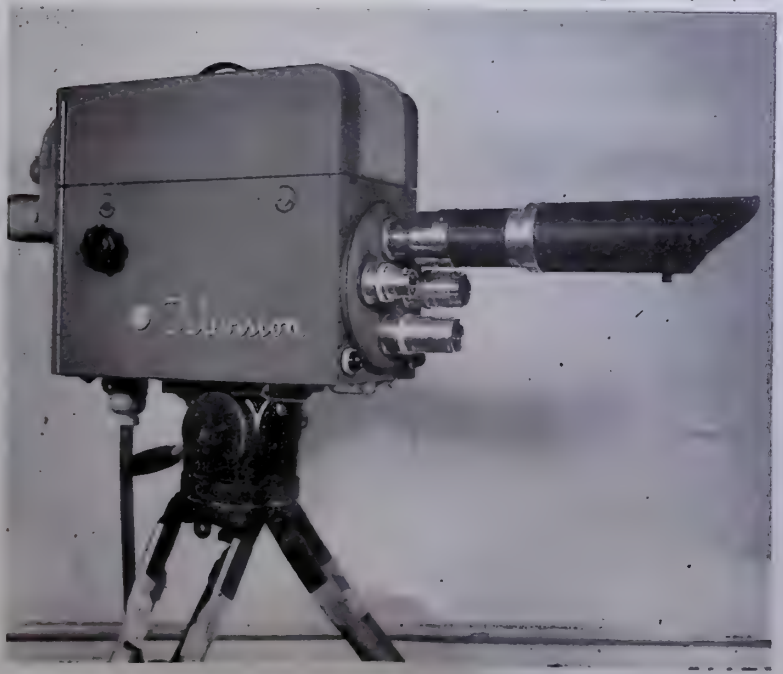
Whereas pre-war telecasting required bright sunlight or brilliant studio lighting, the new camera will pick up scenes by moonlight or candle-light, and in any kind of weather, greatly expanding the field of usable program material. Thus, for the first time, round-the-clock coverage of news, sports, and special events is practicable for the television broadcaster, not only adding variety, but also lowering program production costs by making possible a reduction in the schedule of specially prepared studio shows.

The camera can be used for either studio or field pickups. Together with its tripod, it weighs only 100 pounds complete, and the various units—camera, electronic view finder, tripod, and suitcase-type power supply—can be carried separately. They are specially designed for quick set-up and dismantling. A lens turret with four openings, operated by a simple mechanism on the back of the camera, permits the operator to change lenses and refocus in 1½ seconds, an operation that formerly took from 2 to 3 minutes.

A telephoto lens can be quickly attached to one of the turret openings for long shots, and is quickly and easily detached when no longer needed. Used at the Louis-Conn fight at a distance of 235 feet from the center of action, this lens provided an image comparable to that seen by spectators in the tenth row from the ring.

The electronic view finder, mounted on top of the camera when in use, enables the operator to see on a fluorescent screen an exact replica of the image he is picking up.

THE IMAGE ORTHICON CAMERA, equipped with a telephoto lens brings the scene to the screen whether in the home receiver or in the theatre. Split-second lens changing is made possible by a lens turret revolved by a handle located on the back of the camera. Just below the revolving turret are the "ready" and "on air" lights which indicate when camera is in actual operation. Heart of the new RCA camera is the Image Orthicon pick-up tube.



THE I. O. PICKUP TUBE

The Image Orthicon pickup tube, which is about 15 inches long and 3 inches in diameter, has three main parts: An electron image section, which generates and amplifies the photo-electric current; an improved Orthicon-type scanning section, smaller and simpler than those built before the war; and an electron multipler section, the function of which is to amplify about 1000 times the relatively weak video signals before transmission.

The principle which makes the new tube super-sensitive to low light levels is known as secondary electronic emission, which makes use of electrons emitted from a primary source as missiles to bombard a target or series of targets known as stages or dynodes. At these dynodes, two or more electrons are emitted for each striking electron.

Light from the scene being televised is picked up by an optical lens system and focused on the photocathode of the tube, which emits electrons from each illuminated area in proportion to the intensity of the light striking that area.

Streams of these electrons, accelerated by a more positive voltage and held on parallel courses by an electromagnetic field, speed from the back of the photocathode to a target. Secondary emission of electrons, caused by this bombardment of the target, leaves on the target a pattern of varying positive charges which

corresponds to the pattern of light from the scene being televised.

The back of the target is scanned by a beam of electrons generated by an electron gun in the base of the tube. The electrons making up this beam are slowed down so that they will stop just short of the target and return to the base of the tube, except when they approach a section of the target which carries a positive charge. When this occurs, the beam will deposit enough electrons on the back of the target to neutralize the charge, after which it will again fall short of the target and turn back until it again approaches a positively-charged section.

The returning beam, with picture information imposed upon it by the varying losses of electrons left behind on the target, is directed at the first of a series of multiplier stages near the base of the tube. Secondary electrons, knocked out of this electrode by the bombardment, strike a second dynode, and this process continues, with the strength of the video signal multiplying at each dynode until it reaches the signal plate and is carried out of the tube through an external connection.

OTHER ELECTRON TUBES

Other new electron tubes which have made possible round-the-clock television coverage of news and special events and large-screen home reception of television programs have been developed by the RCA Tube Department.

Projection Kinetoscope

The new RCA Projection Kinescope, with a fluorescent face only 5 inches in diameter, is the "little giant" among television picture tubes which is used in conjunction with RCA's reflective optical system to provide a viewing-screen image approximately as large as a full page of a newspaper. It was the answer to the three-pronged problem of reconciling the production of large, bright television images with the use of a compact, attractive receiver cabinet and reasonable tube costs. Operating at 27,000 volts—nearly four times the voltage used in pre-war picture tubes—it produces a very bright initial image which is picked up by a spherical mirror and reflected through a molded plastic aspherical lens to obtain the larger screen image.

Blue-Sensitive Tube

In addition to the television tubes, another RCA tube which has aroused considerable interest is a new blue-sensitive phototube for use in reproducing sound from color motion-picture film. Heretofore, special treatment of the sound track edge of color film has been necessary to obtain satisfactory sound reproduction.

The need for the new blue-sensitive phototube arises from the fact that most dyes used in the production of color motion-picture film, the use of which is rapidly increasing, are transparent to the near infra-red region of the spectrum, while conventional phototubes used for reproduction are red-sensitive. That has made it necessary to produce the sound track in silver or a silver compound, which has been an added expense. The sensitivity of the new tube is confined to the visible range, permitting use of the same components for picture and sound track portions of the film, without edge treatment. The new tube (Type 1P37) is electrically and mechanically interchangeable with the Type 868 phototube commonly used for the purpose. It is expected to be especially useful for reproduction of 16-mm. sound films made in color, to which it is impracticable to apply edge treatment.

CAMERA CONTROL EQUIPMENT

Auxiliary equipment consists of a camera control unit with monitoring screen and power supply for each camera to be used, a master control and switching unit with power supply for use when more than one camera is operating, permitting push-button selection of the desired pickup at any time, and a synchronizing generator to provide standard sweep frequencies for the cameras and synchronizing pulses for transmission with the video signal. All are engineered for simplicity of operation and built into portable suitcase-type housings. The synchronizing generator can also be used as part of the test equipment of television receiver manufacturers.

All of the new equipment is designed to the advantage of new television stations starting on a modest scale, permitting its use either for remote pickups of already prepared program material, such as sports events and concerts, which do not require rehearsals or expensive lighting, or in place of fixed studio equipment until the time when the station may wish to expand its facilities. For studio use, the camera control units can be mounted on tables or in console-type racks.

TELEVISION RELAYING

New microwave radio link equipment, consisting of a compact, portable transmitter, which may be mounted on a tripod, and a matching receiver, each equipped with a parabolic reflector and a special hook-shaped wave guide, provides a highly directional wide-band relay link for beaming pictures either from the scene of an event to the studio or from the studio to the broadcast transmitter. Reflectors of two sizes—4-foot diameter and 6-foot diameter—are available.

Signals fed from the transmitter through the special wave guide are amplified thousands of times as they pour back from the end of the "hook" into the bowl-shaped reflector for beaming to the receiving antenna, where a reversal of the process provides a second gain of the same value. With 4-foot reflectors, the signal gain at each point is about 5,000 times, providing an effective overall gain of 25,000,000 times. If the 6-foot reflectors are used, a signal gain of about 11,500 times is accomplished at both transmitter and receiver, providing an effective total gain of about 132,250,000 times. Under normal conditions, this relay link can be used over distances up to 15 miles.

This relay equipment is relatively light in weight and can be disassembled into easily portable units. Field setup is merely a matter of connecting the units by means of single plug-in cables and making the necessary adjustments. The transmitter or receiver is housed in a waterproof, cylindrical case on the back of the reflector, and can be quickly removed and replaced with a spare unit if required. The transmitter control is a compact suitcase-type unit.

THE NEW IMAGE ORTHICON PICK-UP TUBE opens a vast new field of great interest to the theatre. Liberating television programming from its traditional dependence on brilliant lighting, the new tube assures round-the-clock coverage of news and special events regardless of weather conditions. The tube, measuring about 15 inches in length and 2 inches in diameter, is especially designed for new lightweight, rugged, portable television camera.

TEST EQUIPMENT

Mass production of television receivers and transmitters can be accelerated and uniform standards assured with test equipment that is now available.

This equipment is already being used as essential studio components for the transmission of television pictures over the air.

The equipment, which supplies a television test signal of known quality, is composed of three inter-related units: a synchronizing generator, timing center essential in all studios and in the manufacture of television equipment; a monoscope camera, which delivers a test pattern (picture); and a distribution amplifier, which amplifies and mixes the timing pulses of the synchronizing generator and impulses of the monoscope camera for delivery to the several test positions on the production line.

Synchronizing Generator

The "brain center" of a television broadcasting system is the synchronizing generator, which furnishes the five fundamental timing and synchronizing impulses necessary for the operation of the RMA standard 525-line, 30-frame interlaced television scanning system. The new Type TG-1A synchronizing generator not only provides the impulses to the studio cameras but also feeds to the television transmitter the impulses which actuate the scanning beam in the home receiver and keep it in step with the output of the cameras.

The five output signals of the synchronizing generator are: (1) the horizontal driving signal which triggers the saw-tooth wave generator supplying voltage for horizontal scanning; (2) the vertical driving signal which triggers the saw-tooth wave generator supplying voltage for vertical scanning; (3) the synchronizing signal, which is a composite wave performing three different functions related to keeping the other signals in step; (4) the kinescope blanking signal, which is added to the transmitted video signal in order to blank out the return path of the scanning beam in the picture tube of the home receiver; and (5) the oscilloscope driving signal, which triggers the built-in monitoring oscilloscope of the synchronizing generator.

The Monoscope Camera

The monoscope camera provides a convenient means for producing a composite test pattern which is known to be linear and of proper amplitude and frequency, simulating the signal received from the air. This permits the technician on the production line to determine at a glance the reproduction qualities of a receiver under test and allows for proper adjustment. It is also of use in television studios to determine whether the telecasting equipment is properly aligned.

The distribution amplifier receives the impulses from the synchronization generator and from either the studio cameras or the monoscope camera and mixes the two to form the composite television signal. This video signal can be sent to the transmitter for telecasting, or, in the case of the manufacturing plant, it can be further amplified by the distribution amplifier and channeled to as many as three test positions on the production line.

Engineers have been actively engaged in developing the electronic synchronization of television systems since before 1930. They developed the partciular system of synchronization which has been standardized by RMA and which is now used by the entire television industry.

The synchronizing generator is the sixth model in a direct line of this development and incorporates all the latest engineering refinements. Together with the monoscope camera and the distribution amplifier, it makes up a system which can be used as a unit of regular television studio equipment, for testing of transmitter operation, or, in the factory, for the mass-production and preshipment testing of television home receivers.

Distribution Amplifier

The distribution amplifier, Type TA-1A, consisting of five separate isolation amplifiers, is especially designed for use with video circuits in television transmitters and synchronizing generators.

In a television broadcasting station, it may be used as a distribution amplifier where video or synchronizing signals from a single source must be fed to several outlets, or as a mixing amplifier where video signals from several sources must be fed to a single line.

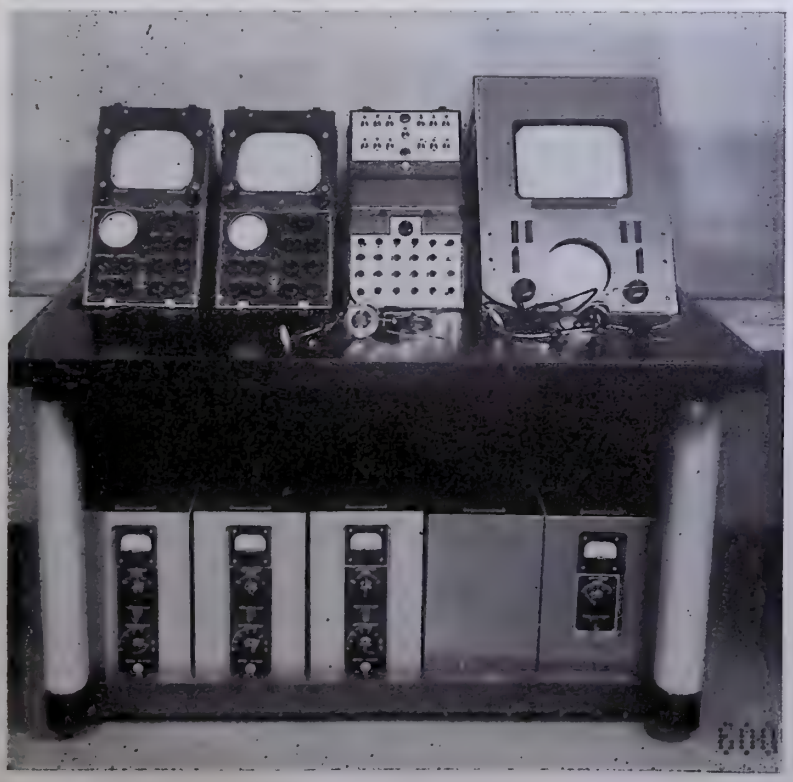
In laboratories and factories where it is necessary to distribute a video signal from the synchronizing generator and monoscope camera to a number of receiver test positions, the TA-1A is used to mix the two signals and distribute the output to the testing positions.

The five amplifier circuits making up RCA's TA-1A are of the "bridging" type and have relatively high input impedances, so that a number or all of them may be paralleled across a video line with minimum disturbance of the driving source. Each amplifier delivers to a 75-ohm output line a signal of the same level and polarity as that it receives.

A high degree of isolation between lines and the source is maintained when the inputs of the amplifiers in the TA-1A are paralleled and the five outputs fed to five separate outgoing lines. Thus, disturbances picked up on one line or even a short circuit will not cause a disturbance or loss of signal on the other lines. This is of considerable importance to good operation, since a failure in one line or in one camera ordinarily would put the whole system out of operation until the line or camera causing the trouble was located and disconnected.

When used as a mixing amplifier, the inputs of the TA-1A may be connected to separate sources, while the outputs are paralleled. The TA-1A can also be used as a conventional amplifier where a relatively low gain is required. The separate amplifiers may be operated with their inputs and outputs tied together. Two in parallel provide approximately twice as much output voltage as a single unit, three provide three times as much, and so on. In addition, this amplifier

PORTABLE CAMERA CONTROL AND SWITCHING UNITS required to operate two television cameras are shown. The units on top of the desk are (left to right) two individual camera controls, a master switching unit, and a master monitoring unit. The units under the table (left to right) are two individual camera power supplies, a master power supply, and pulse-shaping, and pulse-forming units, these requiring no adjustment during operation.



may be used at any point in a television system, regardless of whether the polarity at the point is positive or negative. An adjustment is provided for reducing the low-frequency phase distortion to a negligible value.

The chassis of the TA-1A is standard rack width and is designed to mount either in an enclosed cabinet-type rack or in a standard open rack. It mounts with the RCA Monoscope Camera in a single cabinet to make one compact unit. This equipment will find wide use in a television studio as part of the amplification and distribution net between the cameras, the synchronizing generators, and the transmitter.

"STUDIO ON WHEELS"

Development of a lightweight, self-contained mobile television unit, virtually a "television studio on wheels," which will greatly facilitate news coverage and other remote pickup operations has been announced.

The new RCA mobile television unit, mounted on a standard 1½-ton truck chassis, can be used to transport all the equipment required for picking up, monitoring, and relaying to the studio remote television events such as boxing and wrestling matches, football, hockey, and baseball games, horse races, and newsworthy events such as parades, public ceremonies, and floods, fires, and other disasters.

The custom built body of the vehicle houses the mobile control studio, which is equipped with a specially constructed operating desk for the portable monitoring, control, and power supply units used with the RCA Image Orthicon Cameras. Shock-mounted lockers are provided for transporting the cameras, tripods, cables, and microwave radio relay transmitter. The operating desk is mounted in the rear of the unit, facing two large shatterproof glass windows which give the operators a clear view of pickup activities outside.

Windows on both sides of the unit, adjacent to the large rear windows, increase the field of view, and adjustable curtains on all rear windows make it possible to darken the operating compartment when necessary for efficient monitoring of the television equipment.

Immediately below the rear windows are six cable reels mounted on special crane-like arms which permit easy winding and unwinding. Each reel contains 200 feet of camera cable, permitting easy connection with the cameras, which may be located as much as 1,000 feet away from the mobile unit.

The roof of the unit is reinforced to support the weight of equipment and operators when they wish to use it as a vantage point for cameras or the relay transmitter. A ladder with hand railing is provided for access to the roof through a self-locking waterproof hatch.

The whole unit is completely weatherproofed with rock wool insulation. A heating unit further helps to condition the interior.

This new unit made its public debut at the 1946 convention of the National Association of Broadcasters in Chicago, where thousands of television-hungry people jammed State Street in front of the Palmer House to see the equipment in operation each evening during the convention. Mounted on top of the mobile unit were one of the super-sensitive Image Orthicon television cameras, which scanned the crowd by the relatively dim light of the hotel marquee and nearby shop windows, and a table model television receiver, just off the production line, which permitted spectators to see themselves on the television screen. The same pictures appeared on 20 television receivers spotted throughout the convenvention quarters in the Palmer House.

COLOR TELEVISION

Electronic color television pictures, produced by all-electronic means, have been demonstrated publicly by Radio Corporation of America at the RCA Laboratories, proving that flickerless, all-electronic color television is practical without rotating discs or other moving parts.

This new system, the engineers explained, is a complete departure from mechanical color, shown in various forms since 1925. In announcing this important advance, officials pointed out that the time period estimated by their engineers in December, 1945, when they said five years would be required to bring any color system to the present status of black-and-white television, still holds.

It was further disclosed that a simple, inexpensive radio-frequency converter makes it possible to introduce this all-electronic color television system without causing obsolescence of black-and-white television receivers.

A new color slide television camera, developed by RCA produces signals from 35-mm. Kodachrome slides. Transmission of the picture on the slide is achieved in natural colors when a light beam from a kinescope is focused through the slide and separated into component colors by a system of mirrors and photo-electric cells.

Each of the three transmitted images —red, blue and green—is of the same number of lines, that is, 525; also the horizontal scanning rate and the picture repetition rate of 30 pictures a second is the same as in present commercial television broadcasting.

The receiving set is equipped with three 3-inch kinescopes, which separately receive the signals representing red, blue and green. This trio of kinescopes is called a Trinoscope. From it the three color images are optically projected into a brilliant composite picture which appears on a 15 x 20-inch screen in natural color, free from any flicker, color fringes or break-up of color.

By this new advance in television, simultaneous color transmission, instead of sequential transmission, color by color, is achieved.

Since the electrical characteristics and all of the standards of the green image—including the synchronizing pulses—are identical to those of the present black-and-white standards, any broadcasts from color stations using the electronic simultaneous system can be received clearly on black-and-white receivers by the addition of the easily installed radio-frequency converter. No modifications whatever are required inside the set.

This converter will enable present-day television sets to receive color programs and reproduce them in black-and-white, even when transmitted on ultra-high frequencies. Thus, existing receivers will not be made obsolete by the introduction of color at some future date. On the contrary, their usefulness will be ex-

THE MOBILE TELEVISION UNIT is virtually a "studio on wheels." Mounted in a standard 1½-ton truck chassis, all equipment necessary for pick-up, monitoring, and relay can be carried. Mounted in the rear is a specially constructed operating desk. Below the rear windows are six cable reels mounted on crane-like arms. The roof is reinforced for equipment and personnel. The hook device is the highly-directional microwave link equipment.

tended. For example, if a football game is broadcast by a color transmitter, the owner of a black-and-white receiver can see it in black-and-white. Even one of the first television sets introduced at the time of the World's Fair in 1939 can be adapted to tune-in the electronic color pictures in black-and-white.

Likewise, it will be possible for electronic color television sets to receive the broadcasts of black-and-white stations. Engineers explained that this cannot be done with any known system of mechanical color.

Officials pointed out that a station owner can begin with a black-and-white broadcast service. He may operate a monochrome transmitter on low frequencies and also an electronic color transmitter on ultra-high frequencies using the signal of the color camera to operate both transmitters. With such a dual arrangement, the problem of obsolescence for the broadcaster as well as the viewer is reduced to a minimum. In fact, the broadcaster would thereby be able to render service in both black-and-white and color from the same station.

The realization of this universal system of television, which transmits and receives both color and black-and-white pictures with equal quality, is as far-reaching as was the creation of an all-electronic television system which supplanted the mechanical discs used in black-and-white television when it first began. The realization of all-electronic color is as significant in television as electronic recording was over mechanical recording on phonograph records, or the present color movies over the early mechanical color on the screen.

The new electronic color television system will be available to the entire radio industry. The development is so important in contributing to television leadership for our country that RCA has decided to demonstrate it publicly as apparatus becomes available for each successive step. The initial demonstration, in which still pictures were used, but which sufficiently establishes the basic principle, will be followed by the transmission and reception of color pictures in motion, then outdoor scenes, and finally electronic color television on large-size theatre screens.

This development in television, which establishes an all-electronic system of color transmission and reception, takes the issue of color television out of the range of controversy. All-electronic television is far superior to any mechanical system of color with its rotating discs and other well-known limitations.

The problem is no longer how to transmit and receive color pictures by an all-electronic method, because the basic principles have now been solved. The problem that still challenges is how to operate television broadcasting as a steady and regular service to the public on the higher frequencies, whether in black-and-white or in color. To open the high-frequency spectrum and to make it commercially useful will require propagation studies under broadcasting conditions, development of new circuits, new tubes and new cameras, all of which must be field-tested before commercial standards can be recommended by the industry for approval by the Federal Communications Commission.

Although the problem of all-electronic color television has been solved, it will require a number of years to establish color television as a service to the public. What was done there was to demonstrate the realization of the principle of simultaneous electronic color television. The apparatus used in the demonstration was purely experimental, as developed in the laboratories. It is not commercial equipment, but it reveals that the American people will be assured of the finest color television instruments in the future, such as they now have in all-electronic black-and-white television.

The most important fact to remember in regard to color television is that any commercial system, whether it be mechanical or electronic, depends upon the ultra-high frequency spectrum in which the necessary band width for color exists. No matter how far the development of the principle and the apparatus has gone forward, there must yet be complete exploration and tests in the field of the behavior and limitations of ultra-high frequencies. RCA expects to complete its development of electronic color television apparatus before the ultra-high frequency spectrum is made ready for its use in a commercial way.

The recent demonstration does not change the time period estimated in December, 1945, that it would require five years to bring a color system to the present position of black-and-white television. But no matter how many years pass before the ultra-high frequency spectrum is harnessed for commercial color television service, no one need fear that the black-and-white television set of today is destined for quick obsolescence. The inexpensive converter takes care of that problem. In the meantime, the development of both black-and-white and color television will continue to advance, and eventually will increase the service to the public.

Now that the principle has been demonstrated, engineers are able to go forward with a timetable which is not based on a scientific theory but on the required engineering of equipment. The system already has been perfected to a point where we now could show motion-picture films or outdoor scenes in electronic color, except that we have not had the time necessary to build the essential equipment.

The timetable for future demonstrations of color television is divided into five stages, the first of which features still pictures televised from color slides.

The remaining stages in the timetable of laboratory demonstrations of electronic color television were outlined as follows: Motion picture films, currently on an experimental basis; Live-action studio scenes, by the middle of 1947; Outdoor action scenes, by the latter part of 1947; and Large-screen theatre-size pictures, in 1948.

Broadcasters, as well as theatre men, are mindful, as are the scientists at the laboratories, that new apparatus must be built and field-tested before color television can be brought to the home or even to the theatre in a state of practicability to serve the public. In this task, engineers with their practical knowledge of broadcasting will cooperate in every way with the scientists. The new RCA electronic color system will be included in the plans to establish nationwide television.

HEART OF THE ALL-ELECTRONIC COLOR TELEVISION RECEIVER is the RCA Trinoscope projection assembly, shown here in the rear view of a home receiver. Karl Wendt, research engineer, checks the Trinoscope laboratory assembly (in the lower part of the cabinet), which consists of three 3-inch kinescopes, which separately receive the red, blue, and green signals and project them optically as a composite picture on a screen.

Acoustic Design for Broadcasting Studios

Cylindrical Panels, Irregular Boundaries Have Application in Theatres, Television

DR. KERON C. MORRICAL

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A worker in the field of architectural acoustics almost immediately finds himself in a position considerably different from that confronting workers in the fields of radio or light. This situation pertains to the relation existing between the wavelength of the phenomenon and the dimensions of ordinary objects.

One extreme of this relation exists in the case of light, and optics in general, which deal exclusively with wavelengths essentially infinitesimal compared to the dimensions of ordinary objects. The dimensions of light generators and sources are very large compared to the wavelength of the emitted light; it is only by careful mechanical work that a good optical slit can be made, and even then there is a large number of wavelengths in its width. Reflection and refraction instruments are all large compared to the wavelength of light. Only in the case of a device such as the Rowland diffraction grating does the optical worker meet up with dimensions comparable to the wavelength.

The other extreme is true in the case of radio waves, which are in general very long in comparison with the dimensions of ordinary objects and with the dimensions of devices with which they are controlled. Radio waves diffract around buildings, even around mountains. They are reflected and refracted only by objects of great size, such as the Kennelly-Heaviside and other ionized layers. Electron tubes and other circuit elements are all of a size negligible compared to the wavelength. It is only until comparatively recently, within the past five years or so, that the frontiers of radio have been pushed into the ultra high-frequency region, and this extension of the frontiers to these extremely short wavelengths has necessitated a complete revision of all aspects of that science, bringing about new methods of generation, transmission, and utilization which have come to be classed generically as microwave technique.

In the case of sound, however, the wavelength and the dimensions of ordinary objects are of the same order of magnitude:

(1) for the usually accepted limits of hearing of 20 cps. to 20,000 cps. the wavelength of sound varies from 56 feet to ⅔ of an inch; and

(2) dimensions of auditoriums vary from a hundred feet or more in the case of length, to the order of an inch or less in the case of decorative work.

Thus the two regions overlap almost exactly. The dimensions of sound receivers, and in particular of sound generators, are very closely related to the wavelength of sound involved, and the relation of dimension to wavelength must be taken into consideration in the design of these instruments.

Thus, the factor distinguishing optical technique and radio technique on the one hand from acoustic technique and microwave technique on the other is this matter of the relation of the wavelength to the dimensions of ordinary objects. However, by virtue of the tremendous frequency range involved in hearing, which is approximately 10 octaves, it happens that it is possible to have instances both where the wavelength is large compared to the dimensions of ordinary objects, and where the wavelength is small in comparison. It is a favorite device in the development of equations, when the going gets heavy, to say, "Now, if the wavelength is large in comparison,—" or, "Now, if the wavelength is small in comparison,—" and then proceed into a very beautiful mathematical development. This is very useful, of course, in the case of optics and again in the case of radio, but it will not always work for the science of architectural acoustics for it immediately excludes the most important region. The worker in this subject, therefore, finds himself literally immersed in his field and he must proceed by whatever device is available.

The first simplifying assumption, that the wavelength is large, leads to the knowledge that sound will diffract around columns, and the like, and that low frequencies will reach under auditorium balconies. The second assumption, that the wavelength is small, leads to the prediction of discreet reflections and echoes, and so forth on a purely geometric basis. It is the genesis of the simple and useful tool of geometrical acoustics in which, by picturing sound waves as direct rays, as light, their course within the enclosure can be charted and certain conclusions drawn regarding their behavior. This is particularly true if, as stated above, the likelihood of echo is being investigated, or the possibility of beneficial or non-beneficial reflections being studied, or an area suitable for the location of acoustical materials is being selected. The tool is often, unfortunately, erroneously used to attempt to predict the entire performance of the room and of course it fails because of its original limitation. The complete story of the acoustic perfomance or characteristic of a room is dependent upon its steady state and transient behavior towards sound introduced into it, and, therefore, the geometrical ray tool is no longer sufficient or even useful, but instead a recourse to wave acoustics must be made in order to approach a solution of the problem.

HISTORY OF ENCLOSURES

Before discussing the relationship of wave-acoustics to irregular room surfaces, it is well to digress long enough to take a look at the past history of enclosures used for listening (or microphone pick-up). There are a number of auditoriums, theaters, concert halls, and the like, which were built decades or even centuries ago and which exhibit highly satisfactory acoustic conditions. Many of these were constructed with only the most elementary understanding of acoustic phenomena or of the factors which constitute good acoustic conditions, and yet they are examples today of auditoriums of outstanding acoustics.

The factors responsible for this condition are two, namely: (1) the construction practices of the day, which made use of wood panelling, and which called for intricate column and arch work and other schemes resulting in the absence of large wall expanse, and (2) the need for close grouping of auditors around the stage for reasons of hearing, which resulted in tiers of balconies.

One example of this type of construction is the Burgtheatre in Vienna. A view from the stage shows four levels of loges and a gallery above the loges. There is practically no expanse of unbroken surface and, with the exception of the ceiling, all surfaces seen from the stage are highly absorptive both because of the presence of the audience and because of heavy drapes and other decorative hangings. The Academy of Music in Philadelphia is another example of a theater deriving its good acoustical properties from a fortuitous combination of design circumstances.

I suppose in one way we could say that many auditoriums and other listening areas are suffering from an occupational disease—the disease of modern fireproof building construction practice.

The advent of reinforced concrete, hard plaster, and so forth, resulted in the discontinuance of the use of wood panelling and thus the loss of many of the beneficial effects of wood construction, in particular that of absorption of sound by vibration and hysteresis, and that of reradiaton of sound energy by the panels.

Not only were these benefits lost, but in addition, as a consequence of going all out for fireproof construction, architectural lines were simplified and straightened and the benefits of coffers and other broken surfaces lost. Moreover, the use of closely gathered drapes in the decorative scheme tended to be discontinued and the high absorption, which incidentally possessed a uniform frequency characteristic, was thereby lost. As an example, loges and boxes, ornate and heavily draped and with plush seats were replaced by balconies which, when

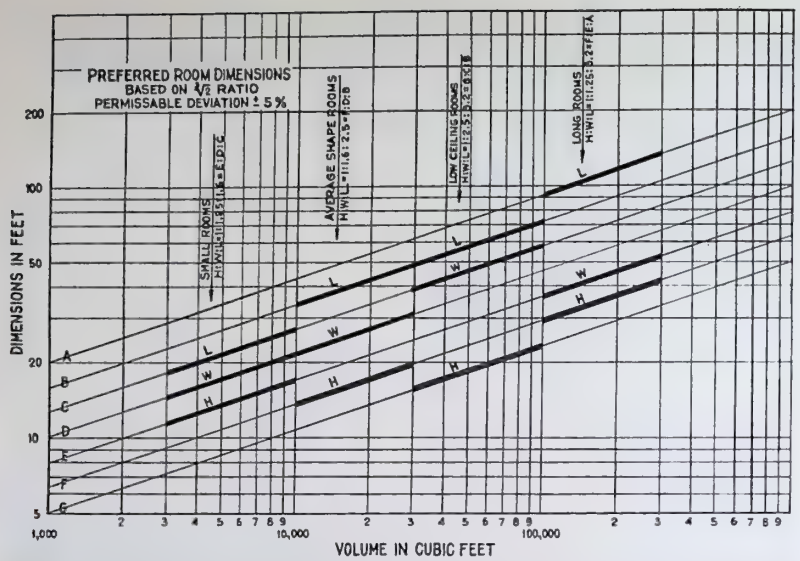


FIGURE 1—Graph showing the preferred room dimensions based on the cube-root-of-two ratio, with a permissible variation of 5 per cent. A complete system of rooms can be built up by starting from the three original dimensions. The common combination, suitable for general studio purposes is the "average" in which the ratios of dimensions are 1:1.6:2.5 The "small" room—with dimension ratios of 1:1.25:1.6 is suitable news broadcasting.

viewed from the stage presented a view of hardwood seats and concrete. The trend to fireproof construction and simple lines reached a point where examples of theaters could be found wherein the rear wall was an unbroken expanse, 30 feet high, of hard reflective plaster and, moreover, had its center of curvature on the stage!

As is usual in such cases, little cognizance was given to proper acoustic design until after the occupational disease had progressed, it was the exception rather than the rule than an auditorium turned out to have satisfactory acoustics. The general scientific thinking of the time is exposed in the terminology of "acoustical correction" used in referring to acoustic work, which of course implies that from the acoustic standpoint the original design was a failure and corrective measures therefore necessary. Remnants of the acoustical correction philosophy, which brought about widespread use of acoustic tiles and only in exceptional cases a revision of shape (a difficult matter to undertake), still persist to this day.

THE NEW PHILOSOPHY

Before discussing the new philosophy, we should review some points. The primary requirements for good acoustics, first ennumerated by W. C. Sabine, are: (1) Sufficient loudness for comfort, pleasure and intelligibility, (2) Freedom from extraneous noise. (3) Avoidance of dead spots, echoes and sound foci, and (4) Adequate separation of successive sounds to satisfy speech intelligibility requirements and musical taste.

Provision of adequate loudness is not now a problem, if consideration is given to the shaping of the stage environs and use made of proper sound reinforcing systems. External noises are outside the scope of this discussion. We have left, then, essentially the problems of proper distribution of sound within the enclosure, and the proper transient behavior of the sound energy in the enclosure. Both these problems require recourse to wave acoustics for their solution.

Probably the most familiar characteristic of a studio—which, of course, is an auditorium, with or without audience, used for microphone pickup—is the reverberation characteristic, a measure of the liveness or deadness of the studio. We are also interested in the way in which the reverberation time varies with the frequency of the sound.

Reverberation is defined as the persistence, or hang-on, of sound after the source has stopped emitting. As distinguished from echo, reverberant sound contains a large number of generally inseparable components arising from many reflections from the surfaces of the room. Now, if this distribution is absolutely uniform, the average sound energy decays logarithmically and the reverberation time is defined as the length of time required for a drop of 60 db.

Note the condition, for if the sound-energy density is not uniform throughout the room, the decay will not be logarithmic and reverberation time not only has no meaning but various compromises have to be made in order to arrive at a numerical answer from the decay pattern. The attempt to obtain a uniform distribution of sound in measurement chambers resulted in such devices as rotating vanes to mix-up the sound, frequency modulation or warble on the signal, non-parallel walls, and diffusing panels and columns but I think it can be said that none was entirely successful.

The present practice we have been following on determining the optimum reverberation time for broadcast studios and the reverberation time versus frequency characteristic has been to use the accepted times published by Morris and Nixon in the case of speech and multiplying these times by a factor of 1.5 in the case of music pick-up. The present trend is toward using a reverberation time versus frequency characteristic which is reasonably flat for small studios, especially if they are to be used for speech with a slight rising characteristic at the low end for larger studios which are to be used for music. This latter characteristic abolished the shape used by MacNair, since the acceptable reverberation time for music is so much greater than for speech.

The practice of using adjustable attenuators is growing. The means of obtaining this adjustable absorbant is either by heavily folded drapes or reversible panels which have rock wool or other absorption treatment on one side and convex plywood panels on the opposite side.

The uniformity of sound within the studio must always depend upon the smoothness with which additional reflective components are added to the aggregate sound energy, which, in turn, must depend upon the placement, configuration or contour, and sound absorption of the room boundaries. This is where classical theory gives way to the modern, and wave acoustics must take over because of the particular relation that the dimensions of the room bear to the wavelength of sound.

Considered as a vibrating system—be it a theater auditorium or broadcasting studio—a room can be studied or analyzed in terms of its normal modes of vibration, each of which is associated with a normal frequency and each of which possesses a space pattern or standing wave. In other words, a room is not merely an enclosure which receives sound energy and contains it until it is dissipated, but is rather a musical instrument which is excited to one or more of its normal modes by the introduction of energy. A perfect and oft cited example of this is a bathroom which contains not only small volume and hard reflective surfaces, but also an occupant who likes to sing. By selecting the proper pitch, or by moving his head around in order to drive the room at the right point, he can produce powerful tones. Unlike a saxophone, however, which has its normal frequencies controlled to be integral semitones apart, the vibrating room will have normal frequencies, called eigentons, which are very close together, or even coincident, by virtue of the dimensions of the room. The formula for eigentons was first developed for the number of electomagnetic, or light, waves in a given frequency interval and was known as the Rayleigh-Jeans law.

The vibration of a room can be a very complex phenonemon, involving all dimensions in a manner not readily susceptible of anaylsis. The complexity is even greater if the room is other than a rectangular parallelepiped. The state of the art at present is just not sufficiently advanced to permit an accurate prediction of performance except in rooms of the most simple shape. (Figure 1.)

So far we have been discussing the steady state response of the room under the excitation of a constant sound introduced into it. The transient behavior of the room when the sound is decaying after the source has been cut off presents an even greater problem to solve. The assumption of geometrical acoustics—that the sound in the room acts as a mass

and thus decays logarithmically as a simple oscillator—is no longer valid. Instead, for wave acoustics, we must consider that, at the moment the source is stopped, there is a particular quantity of energy in the room and that the room is now no longer driven at a particular frequency but instead lapses into one or more, usually many, of the eigentons lying near the driving frequency. The wave patterns associated with these various eigentons in general have different decay rates and, therefore, the composite decay curve, on a logarithmic scale, will not be straight but instead will drop off rapidly at first as those patterns having high decay rates disappear, and then more slowly as control is left to patterns having lower decay rates. Moreover, since the frequencies of the eigentons lie close to one another, the resulting beat notes and interferences will cause a still further departure of the decay curve from a straight line.

SOLUTION OF THE PROBLEM

In applying Sabine's criteria for good acoustics to broadcast studios from the viewpoint of wave acoustics, we can examine two studio characteristics, namely, (1) response of studio for various frequencies, which is the steady state behavior, and (2) reverberation time of the studio for various frequencies, which is the transient behavior.

Technical Angles

A practical starting point for analysis of the steady state response is the studio dimensions, since this response is determined both by the number and the uniformity of spacing of the eigentons.

It is not theoretically possible for the expression for eigentons to yield any means of obtaining a smooth spacing of the eigentons. (Figure 2.) However, the expression does tell us that at high frequencies a more uniform distribution will be obtained than at low frequencies, and therefore, the latter is the place to start work.

The wave pattern in the room which is associated with a particular eigenton is the more complex the higher the order of vibration. In general, there is considerable variation in energy over the extent of the pattern. In other words, while consideration of room dimensions has given us a start towards a uniform response, we still have not achieved the goal of uniform distribution. It is always safe to assume that a room with parallel walls, and in particular a small room, will be possessed of defects. Some standing wave patterns will be set up by sustained notes; flutter echo can exist. Treatment of studio surfaces with the usual acoustic tile is ineffective. A simple calculation shows that for a material whose sound absorptivity is 90 percent—and there are very few of them this high and then only by virtue of a sharp peak—the sound pressure in the reflected wave is 32 percent of that of the incident sound.

A uniform distribution of sound energy must then be obtained by some provision for altering the characteristics of the boundaries of the studio other than its sound absorption.

EXPERIMENTAL RESULTS

A means of obtaining sound diffusion must be provided by roughening the surfaces; but it is not as simple as obtaining optical diffusion, because of the old question of the relation of wavelength to room dimensions.

Surface Irregularities

Diffusion and dispersion of high frequencies is readily accomplished by small surface irregularities, provided they are well distributed over the boundaries of the studio. To obtain this condition for the middle register of frequencies requires much larger irregularities whose size is commensurate with the wavelength. The low frequencies provide the greatest problem, because of the size of the boundary irregularities is limited by the physical conditions of the studio. It can be shown to be theoretically impossible to obtain the condition of diffuse sound for low frequencies in rooms below a certain size because of this physical limitation.

Serrated Surfaces

Serrated, or saw-tooth, surfaces are one means of breaking up large expanses of area. A reasonable size of section as well as a reasonable amount of depth must be dictated by the size of the studio, the purpose for which the studio is to be used, and the lowest frequency of interest.

One example of the use of this method

EIGENTON DISTRIBUTION

$$F_n = \frac{2L\nu}{c} = \left[\left(\frac{n_x}{p}\right)^2 + n_y^2 + \left(\frac{n_z}{q}\right)^2\right]^{\frac{1}{2}}$$

INCLUDING $\sum n = 10$

	p	q
AVERAGE ROOM —	$\frac{3}{2}$	$\frac{3}{2}$
OCTAVE ROOM —	$\frac{1}{2}$	2
CUBE ROOM ——	1	1

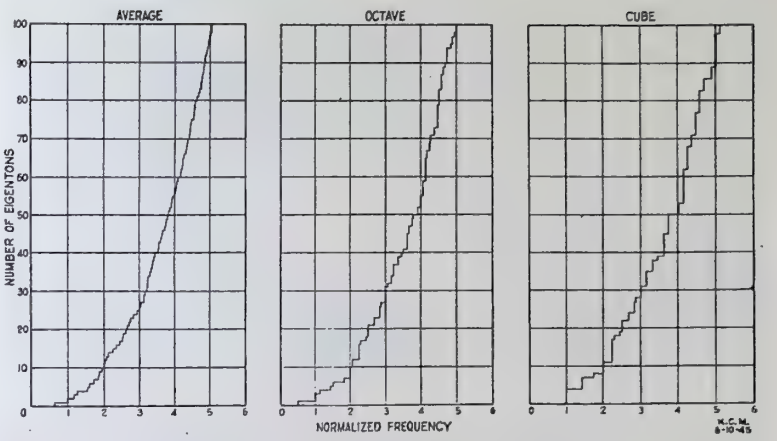
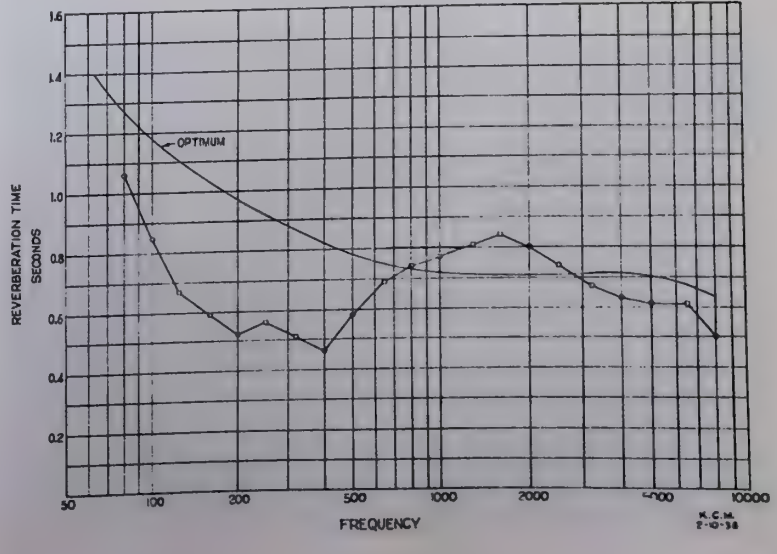


FIGURE 2—Graph showing the plot of the first 100 eigentons for the three room shapes. The graph for the "average" room is the smoothest and most uniform; that for the cube the most irregular, due to the great coincidence of frequencies. The graph is, of course objective and it still remains to translate these differences into subjective values in the laboratory. It is the author's belief that subjectively there is a real difference in these studies.

FIGURE 3—Graph showing the reverberation characteristic of Studio A (volume: 20,500 cubic feet) of the Chicago studios of RCA Victor. Here the result of having to use such panels is very much in evidence. The measured reverberation time follows the design goal except for a large hole centered on about 200 cps. and a slight peak around 1500 cps. Rigid bracing applied in a random manner remedies this situation in the broadcast studio



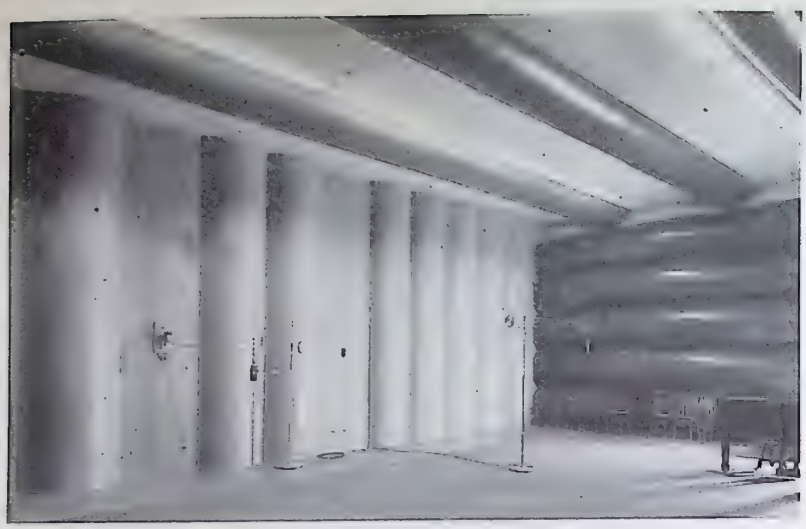


FIGURE 4—A view of an actual studio, looking toward the artist's end. The general concentration of panels in that area can be seen. When this studio was first put in use, the excellency of its performance was at once recognized. Good quality orchestra pick-up could be obtained with artists and microphone in opposite corners, as far apart as possible; and good speech pick-up could be obtained for talking distances up to several feet.

of obtaining uniform distribution is Studio A in the disc recording studios in Chicago. The size of the serration varies from about 1½ to 4 feet. Depth of the serration is of the order of 1 foot. The studio was constructed by setting 2 x 4 studs to give the desired contour, placing the computed area of 2 inch rockwool blanket in the desired space, and then facing over the remainder of the area. Unfortunately, conditions beyond our control (the Chicago Building Code) prevented the use of plywood panels as intended, and instead tempered, fireproof wall board had to be used.

The original reverberation characteristic of the studio is shown in Figure 3. Here the result of having to use such panels is very much in evidence. The measured reverberation time follows the design goal except for a large hole centered on about 200 cps. and a slight peak around 1500 cps. Measurement on the panels showed they were vibrating strongly in the 130 to 500 cps. region. Rigid bracing applied in a random manner remedies this situation.

The prinicpal function of this group of studios, all constructed in the same manner was the making of transcription recordings.

The judgment of the artists, the operators, and the program sponsors was that the acoustical performance was excellent. The studios were not critical to microphone placement, the artists were permitted considerable freedom of motion, and orchestral and piano pick-ups were of high quality.

Convex Surfaces

The modernization of the disc recording studios in New York provided the opportunity of experimenting with curved panel diffusers which had been conceived after the design of the Chicago studios.

The basic function of the diffuser is to perform as an acoustic device combining the diffusive or dispersive reflection with moderate degree of sound absorption.

The use of panelling, and in particular of wood panelling, had its origin in the subjective excellence of older auditoriums constructed of wood, as discussed earlier in this article.

The first experimental panels were designed on a basis of ease of fabrication by inexperienced mechanics from materials available in any lumber yard. Plywood, ¼ inch thick, 4 feet wide, and 8 feet long, was selected as the skin of the diffuser which was to be circular in shape. This skin was to be supported on a number of segments which were to be randomly spaced to avoid selective absorption effects. The use of a depth of 11½ inches for these segments permitted the use of standard 12-inch lumber and yet provided irregularities effective down to an octave or more below 1000 cps. for which this depth corresponded to a wavelength. These dimensions correspond to a radius of curvature of 22 inches for the skin and an overall width of 39 inches for the panel.

Panels very similar in construction to the one shown on the drawing were used in modernizing Studio No. 1 in New York. In building this room to the cube root of two criterion for dimensions, the ceiling height of the old studio was the governing dimension. This being 15 feet 8 inches the resulting floor size was 42 feet long by 27 feet 10 inches wide for the "average" room. With the exception of the floor, only two materials were used for the studio surfaces; the curved plywood panels and 4-inch thick rock wool bats covered with colored burlap.

The relative areas of these two materials were calculated on the basis of established values* of the absorption of the rock wool and the best indicated value of the total absorbing action of the plywood panels. These materials were carried by a frame, built within the original studio but mechanically independent of it, except for the lower member of the frame and the ceiling suspension, insulating felt being used for isolation in both instances.

This independence of the walls of the new studio served to give freedom from any building vibration that might be present and, at the same time, accomplished the purpose of making the new structure an integrated whole which, therefore approached more nearly the older wooden construction that allowed the telephonic transmission of the sound through it.

However, where transmission is calculated between the "live" and "dead" ends, it may be considered good design to make the stage in the form of a shell using polycylindrical surfaces and the audience space treated with sound-absorbent materials.

The design point for reverberation time was somewhat higher than the

FIGURE 5—A view of the same studio as in Figure 4, looking toward the control room end. The two horizontal panels seen directly above the observation window were among those added to increase reverberation time. The consensus after some usage of this studio was that the reverberation time could be still further increased, and this policy has been carried out in subsequent studio designs. First recording made here was given a New Yorchid.

* Data on absorption coefficients may be obtained from National Bureau of Standards Letter Circular LC-714, official bulletins of the Acoustic Materials Association, and textbooks on architectural acoustics.

usually accepted values for studio purposes on the theory that the greater diffusion and consequent more uniform distribution of sound energy would result in a smoother decay curve that would permit a longer time. The measured reverberation time of the studio, while having a satisfactory frequency characteristic, was considerably less than designed for, indicating that the diffusing panels had more absorption than originally believed. Therefore, the rock wool was removed and replaced with panels until the reverberation time was increased to the desired value.

Figure 4 shows a view of the actual studio towards the artist end. The general concentration of panels in that area can be seen. Figure 5 shows a view looking towards the control room end. The two horizontal panels seen directly above the observation window were among those added to increase the reverberation time. When this studio was first put in use the excellency of its performance was at once recognized. Good quality orchestral pick-up could be obtained with the artists and microphone in opposite corners as far apart as possible; good speech pick-up could be obtained for talking distances up to several feet. The first commercial recording—Bea Wain singing "I'm the Lonesomest Gal in Town"—was given a NewYorchid by Walter Winchell. The consensus of opinion after some usage of the studio was that the reverberation time could be still further increased, and this policy has been carried out in subsequent studio designs.

Along with the increasing use of convex plywood panels, advances and improvements were made in the constructional details of the panels and more knowledge of their action gained. A very satisfactory panel is made from 4 x 8 foot plywood formed over curved segment braces and is fitted at the edges with 2 x 3 inch strips which have been routed and held together with 1 x 3 inch back braces. The segment braces, which are spaced at random, have strips of ½-inch wide fiber-board placed between them and the panel to prevent rattling. An idea of the dispersion produced by a panel like this can be obtained from the polar reflection characteristic as shown in Figure 6.

The curve was obtained by rotating the panel about its axis while keeping the source and the directional pick-up fixed. For purposes of comparison, the reflection from a flat panel is also shown. The particular pattern obtained for the convex panel is not due solely to geometrical reflection where a single virtual image is involved but is rather the composite effect of such geometrical reflection and the direct radiation pattern as the vertical panel vibrates and then reradiates under the action of the incident energy.

The same, of course, holds true in the case of the flat panel which thereby possesses some advantage over a rigid reflector. However, the receipt and reradiation of energy by the panel is not an instantaneous affair. The panel, once excited, continues to vibrate in a manner controlled by the rate of loss of energy through internal damping and radiation. surfaces versus rock wool surfaces and

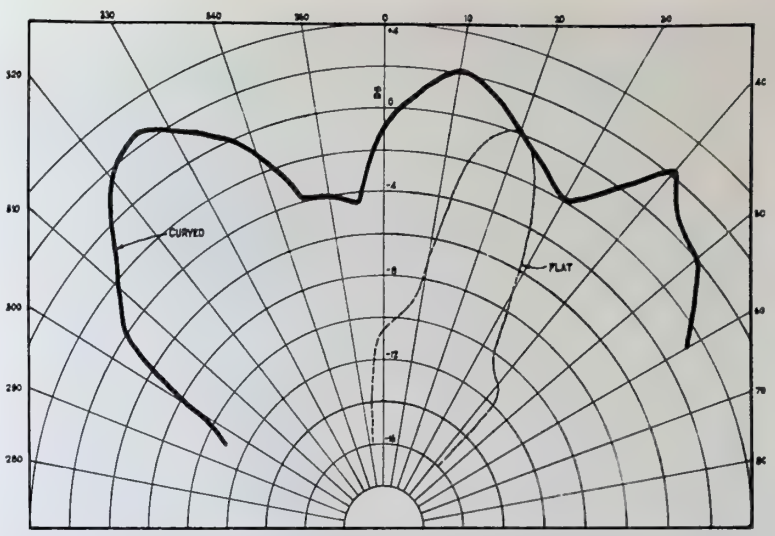


FIGURE 6—Graph showing the polar reflection characteristic of a satisfactory panel, made from 4x8-foot plywood formed over curved segment braces and fitted at the edges with 2x3-inch strips which have been routed and held together with 1x3-inch braces. The segment braces, which are spaced at random, have strips of ½-inch wide fiber board placed between them and the panel to prevent rattling. The graph gives an idea of the dispersion.

plastered surfaces can be arrived at only by calculation of the total absorbing power of the studio. Once the number of square feet of wood surfaces has been established for any given size studio, an alternate method of treatment may be arrived at by substituting an equivalent absorbing material as, for example, a 1-foot strip of rock wool, having an 0.8 coefficient, may be substituted for a 4-foot strip of wood panelling which has a coefficient of 0.2. The 1-foot strip of rock wool should be located in the center of the area formerly specified for wood panelling in order to realize the advantages of diffusion and added absorption due to diffraction effects.

The use of sound-absorbent treatment, without diffusion surfaces, is not recommended for small studios, due to the eigenton effects between panel walls which have insufficient sound absorption.

If sufficient absorption is used to reduce the diffraction effects, then, of course, the small studios will be overtreated.

The cord and dimensions of polycylindrical surfaces should be comparable to the wavelength of the sounds dealt with. Since the wavelength of sound in music and speech will vary from ¾ inch to 25 feet, the panel dimensions should be varied as much as possible within the architectural limitations of the studio.

Since the quantity of energy returned to the room by the panel is essentially the same, the wider the angle of reflection of the panel means that this energy is

FIGURE 7—A sound listening studio, built in Indianapolis for the purpose of critical quality judgment of sound reproducing systems, made use of three different sizes of panels with different curvatures to obtain further asymmetry in the diffuse sound pattern. One end of this listening studio is seen here. Another feature of this room is the multiplicity of loudspeakers, used to create a feeling of body by enveloping the auditor with sound.

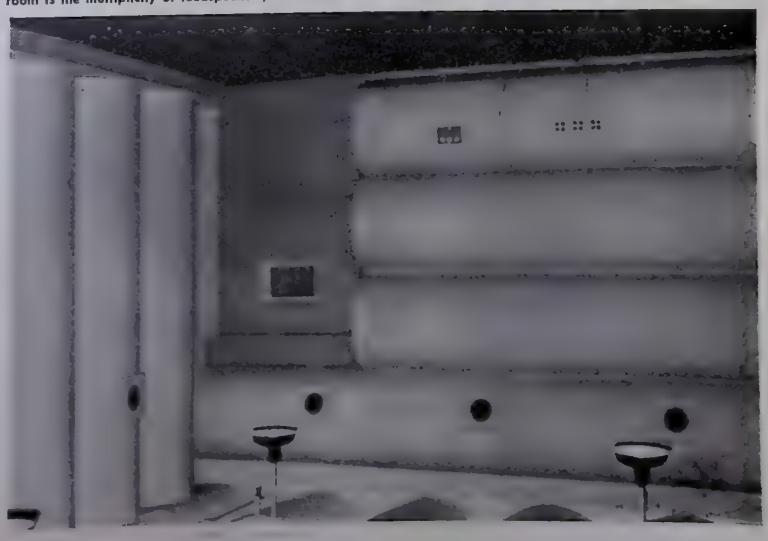


FIGURE 8—Another studio showing the use of cylindrical panels, horizontally as well as vertically, on both ceiling and walls. The only satisfactory practice to date for excluding sound which enters by way of the doors has been to provide a sound lock, with solid, heavy doors, with air-tight fit at each end. For frequency-modulation studios, polycylindrical construction gives better diffusion and less loss than usual at the extremely high frequencies.

spread over a wider area and therefore the intensity level of the individual reflection is lower.

The performance of Studio No. 1 was largely instrumental in influencing WFAA to adopt a design employing convex diffusing panels which in addition were of several different sizes. A sound listening studio built in Indianapolis for the purpose of critical quality judgment of sound reproducing systems, made use of three different sizes of panels with different curvatures to obtain further asymmetry in the diffuse sound pattern. One end of this listening studio is shown in Figure 7. Another interesting feature of this room is the multiplicity of loudspeakers used to create a feeling of body by enveloping the auditor with sound. The reverberation curve for this studio is

A number of other broadcast and recording studios have also used the idea of cylindrical reflectors, both of wood and of other materials in various sizes and combinations. (Figures 8 and 9.)

An aside on the matter of sound-insulating doors to be used in studio construction should be interpolated here. The only satisfactory practice up to date for excluding sound which enters the studio by way of the doors has been to provide a sound-lock, or vestibule, with solid, heavy doors, with air-tight fit at each end. A good sound-proof door designed by Sabine, of the Riverbank Laboratories, may be commercially obtained.

For frequency-modulation studios, the polycylindrical construction is all right, because it gives better diffusion and less loss for the extreme high frequencies.

Additional considerations are needed in television studio design that are not considered in the conventional design of small studios. Television studio design should include the consideration of rock wool treatment on all walls and ceiling similar to the practice which has been used on sound motion-picture stages in Hollywood during the past 15 or 20 years. The acceptance required for any practical scene which is being revised should be built into the set rather than in the studio itself.

Wood panelling should be used in polycylindrical designs until more data have been gathered relative to the internal damping, stiffness, response characteristics, and so forth on other types of materials.

Other materials—such as tempered Masonite, plaster, and the like—generally will not provide sufficient absorption, and will not have the same response-frequency characteristics.

FIGURE 9—A variation on the panel theme is the use of "diffusispheres" to fan out the reverberations so that the waves do not bounce back into the microphone. Note also that the ceiling and side walls are of a serated design and that the windows of the control and observation rooms are differently inclined. This studio, located in New York's Radio City, was designed by George Dixon, acoustical engineer of National Broadcasting Company.

GENERAL CONCLUSIONS

Certain general conclusions regarding the type of studio discussed here can be made on the basis of the experience and information accumulated during the period these studios have been in operation.

(1) A reverberation time somewhat higher than previously accepted is not only satisfactory but actually appears desirable.

(2) The reverberation characteristic tends to be flatter than those previously recommended.

(3) A more diffuse condition, or a more uniform distribution of energy throughout the studio, is attained than in the case of studios of conventional design.

(4) The decay curve is smoother and more nearly approaches the logarithmic than in conventional rooms.

(5) The environment of the room is generally favored by the musicians and performers.

(6) Incommensurate studio dimensions, such as those given by the cube-root-of-two criterion, should be adhered to in the case of medium—and particularly in the case of small rooms where a troublesome distribution of eigentons will be present. For large rooms, in which the dimensions are large enough to place the first eigentons below the low frequency range, there will usually be no difficulty encountered from this source.

(7) The reduction of interference effects is very real.

(8) It appears desirable to incorporate a variable acoustic condition in order to provide optimum liveness for both speech and music. This would not solve the problem of accommodating both functions simultaneously, which may require either separate studios or a compromise in reverberation with respect both to time and frequency characteristic.

(9) The construction of the panel has measurable effects upon the characteristics of the studio. This statement refers to the manner of bracing, the material of which the skin is made, the manner of applying the skin, the finish, and so forth.

(10) The distribution of the panels within the studio, with respect to panel size and with respect to the location of highly absorbent areas has measurable effects upon the flatness of the reverberation characteristic and the smoothness of the decay curve.

SECTI
PROFESSIONAL
16MM FILM USE
1946-47

16-mm. Film — and a Theatre That Uses It!

As Industry Executives Discuss the Idea Marcal Theatre Shows Their Practicality

If there is one point on which exhibitors are in general agreement, it is that they all expect that the 16-mm. field is something with which they must reckon in the post-war period, and that it will be the type of competition that will affect the grosses of established theatres adversely unless steps are taken by the latter to protect themelves.

If an exhibitor were asked to choose between 16-mm. competition and television as to which he thought most likely to affect his business in the near future, first place would go to 16-mm. It is not that the theatreman treats television lightly, but he feels the closeness of the 16-mm. problem, whereas television is still enmeshed in rosy statements, experimental tests, and a few production difficulties.

USE OF 16-MM. EQUIPMENT

As far as the 16-mm. brand of exhibition is concerned, the exhibitor appreciates the strides made by the armed services with it during World War II. Thousands of 16-mm. prints of shorts and features were given by the motion picture industry free to the servicemen during World War II, and plenty of 16-mm. projectors were manufactured that would do justice to the screens of good-sized theatres. Furthermore, while these reports have not been officially confirmed, it is no secret that these are being made on a professional standard by 35-mm. manufacturers, using arc lamps as the light producing source.

The average exhibitor is well acquainted with the fact that 16-mm. projection has become an established part of courses in many schools and institutions, that in every city of any size distribution agencies are ready to service the needs of any organization, club, lodge, and indiviual who wishes a 16-mm. show, and that the number of these units is growing by the month.

He is also certain that as the production facilities of the 16-mm. projector manufacturers grow, there will be plenty of machines on the market in addition to large amount of surplus machines which the army used during World War II, and that as the months roll around, the demand for these machines can easily be handled by manufacturers.

He also knows from a standpoint of economics that the use of 16-mm. prints and equipment are not only lower in cost all around, but that this type of equipment is lighter and easier to handle, that 16-mm. is non-inflammable, and when used might eliminate the use of fire-proof booths.

He further knows that technical advancements in 16-mm. arc projection equipment now are said to be able to reproduce a picture on a screen over 125 feet distant with no distortion, that perfected change-overs now permit smooth running, uninterrupted operation the same as with 35-mm. film, and that 16-mm. projectors can hold up to 1,600 feet of film easily, cutting down on number of changeovers necessary.

THE MARCAL THEATRE, in Hollywood, is said to be the first theatre in United States to show 16-mm. motion pictures on a commercial basis and in a theatre created for this express purpose. Premiere attraction was the Kodachrome production, "The People's Choice," produced by Planet Pictures. The entire program, even the newsreel was on 16-mm. film. Planet Pictures was set up to make 16-mm. pictures for commercial entertainment.

ALLIED'S QUESTIONNAIRE

So much for the mechanical and distribution details. What about the product?

The key to this important question rests in the laps of the producers and distributors. Will they make 16-mm. versions of their new pictures available for use in this country?

It was with this thought in mind Allied States Association of Motion Picture Exhibitors not long ago sent out a letter to the principal national distributors, to ascertain just exactly what the producers-distributors had in mind. The results are interesting, even though the answers are not always as exact or concise as they might have been.

Here is a letter Allied sent through Col. H. A. Cole:

The matter of the future of 16-mm. film has been receiving a great deal of attention on the part of trade papers, and it appears that the subject will be very live during the coming years. In view of this, I would like to present a few questions to you with regard to the future policy of your company.

1. Is it the intent of your company to make your future films into 16-mm. either of all or a substantial part of your product?

2. Is it your intention to have continuing control of the distribution of such 16-mm. prints, or do you intend to farm it out?

3. If you are going into the 16-mm. line, have you decided upon a definite policy in the handling of such film? In other words, do you intend to distribute to established or to-be-established theatres, and, if so, will you give consideration to your present established customers?

You can readily understand the importance of this subject to the exhibitor, and we would appreciate a full discussion of the entire matter from you so that we can get your point of view in our discussions. I am writing this letter so as to get the subject before you and to get your viewpoint as to the future probabilities along these lines.

THE EXECUTIVES REPLY

Here are the answers in part, as received.

From A. Montague, Columbia vice-president and general sales manager:

As you know, we have reduced very

few of our pictures to 16-mm. We have tried to restrict the use of such pictures as we have reduced to what could be termed as "locked in" situations, and in no case to be used in competition with our 35-mm. accounts. I agree with you that a great deal more thought will be given to the narrow gauge film in the immediate future than has been given in the past. Since we have been very slow in the past to promote the 16-mm. field, we are going to be equally slow in forming a policy for the future, believing it is better to observe and watch carefully what would be best for our accounts as a whole and for the company itself. When we do arrive at a definite policy, we will be only too anxious to let you know all the particulars.

From William F. Rodgers, MGM vice-president and general manager of sales and distribution:

In response to your specific inquiries, please be advised: one, we are not now considering any activities in the domestic market on 16-mm. In view of my response to your first inquiry, the second and third specific questions do not require any answers.

From Samuel Steve Broidy, president of Monogram:

With respect to Monogram's intentions insofar as the future of 16-mm. film is concerned, there is nothing more that I can add to the conversation that we had in New York. We have not done anything in this connection for the past three years. It is not our present intention to do anything in the near future that we can anticipate at this moment with respect to 16-mm. film. If we do change our minds and make any definite moves in this direction, I shall most certainly contact you, and advise you of our plans.

From Charles M. Reagan, Paramount vice-president and general sales manager:

In response to your letter with reference to 16-mm. film, I wish to assure you that our first interest will continue to be that of our customers with permanent investments and established theatres. We have made available relatively few pictures in 16-mm., and have always exercised a careful control over their distribution. We have no intention of altering this policy currently, and, as a matter of fact, have recently curtailed this distribution further.

From Harry H. Thomas, PRC president and general sales manager:

With respect to your first question, may I say we have not set a definite policy yet regarding the 16-mm. film. Pathe Industries, our parent corporation, does own a 16-mm. company called Pictorial Films which distributes 16-mm., and which naturally gives us pretty broad control over their operation. However, when we do know more about our own policy in connection with this type of product, I will be very glad to communicate with you further.

From Ned E. Depinet, RKO Radio vice-chairman of the board and executive vice-president:

The answers to your questions are as follows: 1. Yes. 2. We will continue control of the distribution, whether same is handled by ourselves or farmed out. 3. We will, as always, give consideration to our present established customers. Regarding the balance of your question No. 3, we do not know of any established 16-mm. theatres. If 16-mm. theatres are established, we will consider and determine our course in respect to each applicant when and as they appear.

AT THE PREMIERE of "The People's Choice" at the Marcal Theatre, the picture's star, Louise Arthur, and the director, Harry Fraser, engage in a pre-screening chat for many listeners to KMPC's 710 kilocycles.

From James R. Grainger, executive vice-president and general sales manager of Republic:

We are reviewing the 16-mm situation, but as of this date have made no definite decision. I am, therefore, in no position to answer the questions in your letter.

From Thomas J. Connors, vice-president in charge of sales for 20th Century-Fox:

Prior to my becoming connected with 20th Century-Fox, a contract was entered into and is still in existence for the distribution of 16-mm. film through Films, Inc., 330 West 42nd Street, New York City. We retain definite control as to what subjects are available in various categories, and we have a requirement that every location served by them must have our company's approval. They do not distribute 16-mm. film to theatres, and we do not anticipate servicing theatres with 16-mm. film in the immediate future. It is our belief that a certain amount of 16-mm. film is necessary, and that a controlled distribution of the pictures will prove an advantage rather than a detriment to our established 35-mm. theatre accounts.

From Gradwell L. Sears, vice-president of United Artists:

I do not believe you have a great deal to worry about in the case of United Artists on the subject of 16-mm. competition. In the first instance, United Artists does not control the 16-mm. rights on the pictures which it distributes. These 16-mm. rights usually revert to the producer some five or so years after we start distributing the picture. After our distributing rights expire, the producer is then at liberty to dispose of the 16-mm. rights as he sees fit, and, in most cases in the past, this has been done by an agent of the producer. Therefore, answering the items contained in your letter specifically—1. No. 2. We do not intend to farm out 16-mm. distribution. 3. Chances are the majority of our pictures will no longer be reduced to 16-mm. except for use in the zones of occupation, and we have no intention of distributing 16-mm. films in opposition to regular constituted theatres.

From William A. Scully, Universal general sales manager:

In answering your various questions, it is the intent of our company to make 16-mm. feature films but only that part of our product which we believe suitable for non-theatrical showing. It is the intention to have complete control of the distribution of such 16-mm. film, and our distributors of these prints cannot book any situation without first the approval of our local branch manager, in which territory the film is being shown, and second by the representative of Universal Films, Inc., who is in charge of the distribution of 16-mm. film in New York. In reference to your third question, we do not contemplate supplying any 16-mm. film to any established theatre or any theatres to-be-established, and neither do we contemplate having our 16-mm. film interfere with the showing of our 35-mm. film in any theatre throughout the country. It has always been our established policy that we will not approve the showing of our 16-mm. film in any situation that interferes with present theatre operation.

From Benjamin Kalmenson, Warners vice-president in charge of sales:

It is impossible for me at this particular moment to tell you what my company's policy will be in this respect, as the foreign field and many other conditions in the ever changing future may make it advisable for us to develop that phase. However, I can tell you prior to the war, we never put any of our subjects on 16-mm. film, and never licensed any of our product to be put on 16-mm. film to be distributed by anyone. As far as I know, we have no intention of doing so in the future. At the moment I can tell you very definitely that we are not going into the 16-mm. field, and I am sure that is the answer you desire.

IMPORTANCE OF PROBLEM

That exhibitors realize the importance of the problem is well known. For quite some time, Allied has had a committee investigating the problem, and while no solution is as yet forthcoming, pending some certainty as to the availability of product, the obvious answer is that the exhibitors should keep a careful watch on what is going on in their territories, and even get into the field if they have to.

Of course, many exhibitors have been experimenting with 16-mm. in their theatres. Some have found that taking a local newsreel, and showing it on their screens, with a commentary supplied by the public address system, has proved an asset at the box office.

What the exhibitor would like to know is whether a producer-distributor would use the 16-mm. threat to force a deal. For example, if a distributor failed to come to terms with an established exhibitor, would that distributor rent a hall or even a large store in the town or area, and, after complying with the fire laws, exhibit a 16-mm. version of the picture? It is not difficult to picture a situation

wherein traveling trucks, complete with living quarters for the operator, in addition to all the necessary mechanical equipment, would tour areas where established theatremen have been loath to sign at the distributors' terms. Such trucks are now in use, and have proved efficient and successful in operation.

That the distributors have made complete surveys of the 16-mm. field has been rumored in the trade from time to time, with one even having made a physical analysis of its exchange properties for storing 16-mm. versions, when and if they became necessary.

As a further indication of how the field has grown, an advertisement appeared in a Philadelphia newspaper, as follows: "Circuit managers to operate motion picture exhibitions in theatreless communities. Remuneration good. No experience necessary. Ideal Pictures Corporation, 28 East 8th Street, Chicago 6, Ill." Ideal is an organization with national branches in addition to a complete catalog of the available product, including shorts, features, and complete lists for schools, institutions, churches, etc. While this product is not of recent vintage, in communities where the pictures had not played, the age factor should not be much of a handicap.

EQUIPMENT AND PRODUCTION

Plans to manufacture a 16-mm. projection machine with sound to retail for under $200 were announced recently by George Hirliman, president of the International Theatrical and Television Corporation, whose company claims to be the largest producer-distributor of narrow-gauge entertainment films in the country. Hirliman claims to have a backlog of more than 3,000 features, westerns, and shorts, including some major product, with its annual production program of 60 features, some in color, already set. ITTC has 17 exchanges throughout the country as well as a foreign sales department.

There are many other organizations in the field, either already functioning or getting ready to attract potential users of the 16-mm. product.

In Hollywood, Planet Pictures, Inc., already has produced "Jeep Herders" expressly for the 16-mm. field in color, in addition to another feature, with critical comment extremely satisfactory. Other companies are also reported getting ready to produce.

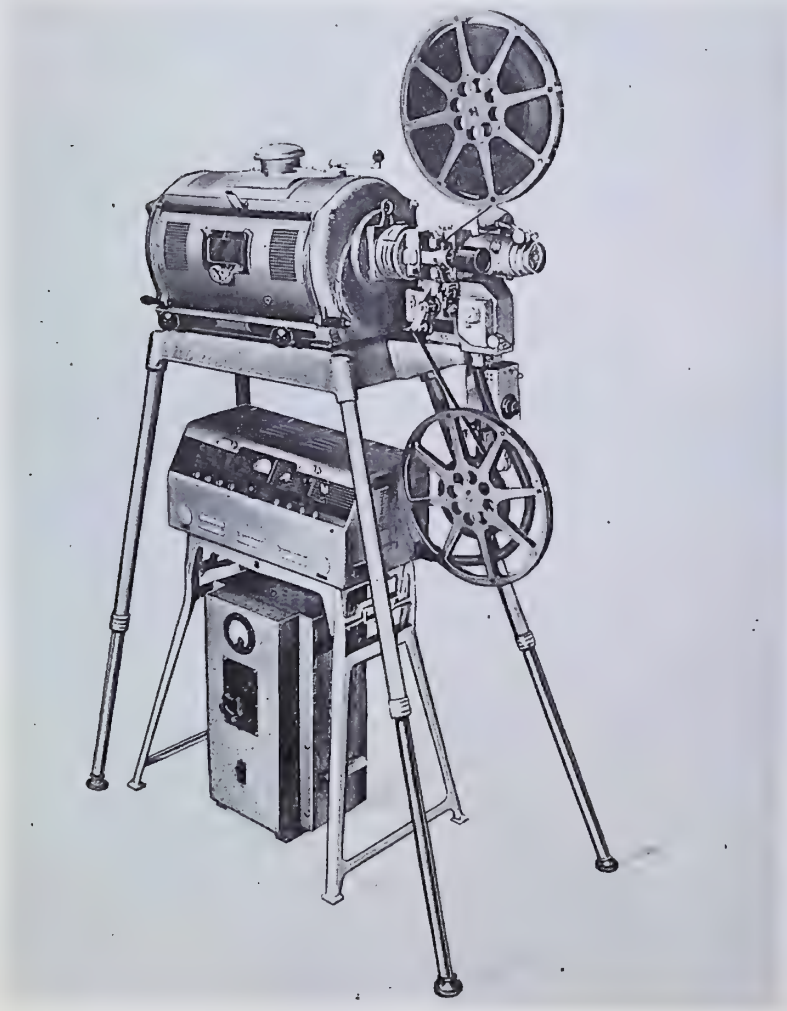
The Surplus Property Administration, Washington, established an interim procedure to permit schools and other nonprofit-making institutions to apply directly to disposal agencies for the purchase of surplus property at reduced prices, pending the setting up of a permanent system not later than Jan. 15, but there is little indication at the moment that any motion picture projectors would be available for such disposition for some time to come. Approximately 50 projectors have been declared surplus so far, but none of them was available for schools, because government agencies exercised their priority to get them. SPA officials said that it is expected that only a very limited number of projectors will ever become available.

Total purchases by all military services during the war were about 44,000. A large proportion of these were abroad and, under the prohibition of the Suplus Property Disposal Act, may not be returned to this country for sale. A considerable number of those brought back, as well as some now in use here, will be retained by the services for training.

And while there have been reports that some of the 16-mm. prints of new features used by the armed services have been lost, strayed, or stolen, thus presenting possible bootleg competition to theatres, there has been no verification of the report, although this is always a possibility, what with so many prints in use.

In short, therefore, threat for the established theatre is ever present. It would be foolish for the exhibitor to emulate the ostrich, and stick his head in the sand. Perhaps the competition won't be so keen for the big city theatreman, but in the less populated areas and the wide open spaces the question is a very serious one. Only by constant vigil, either individually or through organizations, will the theatreman be able to protect himself.

A "POSED" PICTURE of the Bell and Howell Filmoarc 16-mm. arc-lamp, sound-film projector installed at the Marcal Theatre. The projector, even to the carbon arc lamp (delivering approximately 1,200 lumens), has been engineered for the express use in theatres and auditoriums, where rugged construction is demanded because of hard usage. Magazines hold 2,000 feet. Intermittent movement has a 9:1 ratio for reliability and efficiency.



THE MARCAL THEATRE

It would be a rare thing indeed today if during the course of a conversation among industryites, the phrase "16 millimeter" does not creep in somewhere. The industry air is full of the word. The distributors have indicated that they will protect the 35-mm. field here, but notwithstanding, the exhibitor is full of speculation on the effect that the war-nurtured 16-mm. film will have on his house, and how the whole thing will shape up in the end.

Despite all kinds of talk about "what will happen," the fact of the matter is that it has already happened. For not long ago, an audience at the Marcal Theatre, Hollywood, owned by Jay Sutton and Al Gaston, witnessed a world premiere that was off the beaten track of such events. For the first time in motion-picture history, a 16-mm. program was being projected onto a standard sized theatre screen. The program was all Planet Pictures product, including "The People's Choice," featue; "Adventure in Yosemite," short subject,

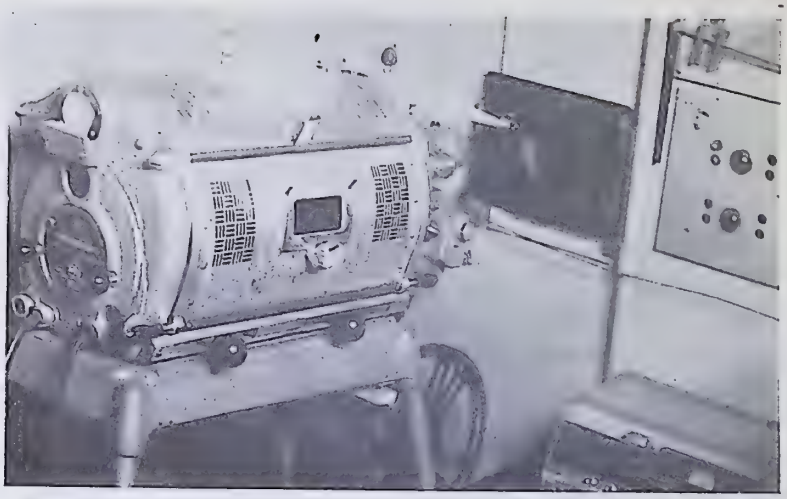
and a newsreel, all in Kodachrome.

Going over the facts of the premiere of "The People's Choice," certain things stand out. Here was not a case of an original 35-mm. print being converted to 16-mm. size, a very popular process during the war, as returned veterans can testify, for these films were made by 16-mm. equipment for 16-mm. showings. And this was not a case where a hall was rented for a few bucks, seats arranged or polished, and the place swept up, and made halfway comfortable. Here was a complete 16-mm. program of entertainment films being projected in a regular theatre, on a standard 16 x 22-foot screen. Prior to the premiere, two Bell and Howell Filmoarc projectors were carried into the house's pojection booth, and installed adjacent to the regular 35-mm. projectors. The length of the throw from the projector to the screen was 123 feet. With these facts in mind it is easy to see why the show at the Marcal was of such importance.

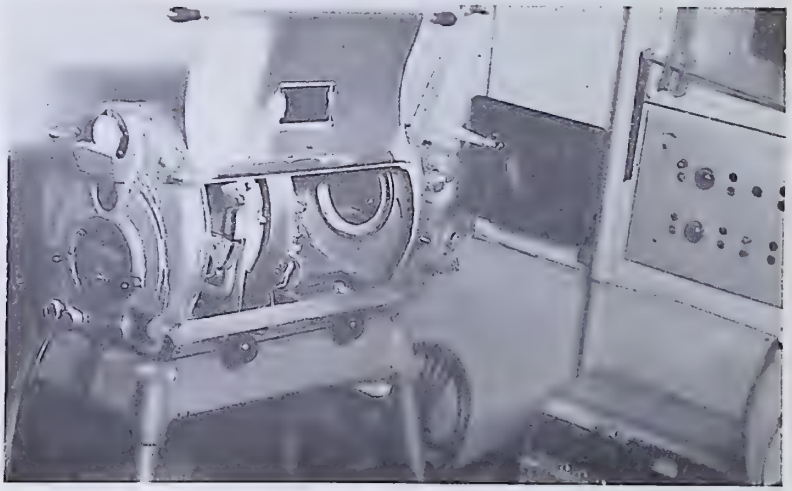
It was an impressive affair. Screen, radio, and stage stars attended, in addition to prominent religious leaders, educators, and other distinguished guests. Before the showing, California's lieutenant governor, Frederick F. Houser, spoke over radio and public address systems. All seats were reserved at $2 plus tax for the big night, but on the following day "The People's Choice," together with a second Planet feature, "Detour to Danger," started an extended run at 50 cents plus tax.

The success of the premiere and run was apparent. Sutton declared that, as a result of the run, the use of 16-mm. facilities in the 35-mm. theatre has been proven wholly practicable. "Although we cannot yet be sure how much of the patronage is due to the novelty of the idea," he said, "we played to more people over the weekend than the house ordinarily draws." The owners estimated a $2,500 gross for the first week.

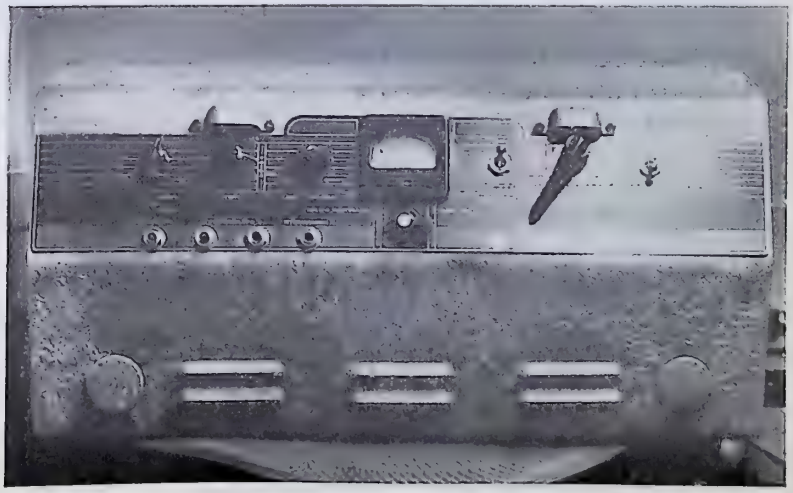
The program was supplied by Planet president Jack Seaman, who, with his associates, planned Planet Pictures while engaged in war production at Lockheed Aircraft Corporation. The company believes that its series of forthcoming productions, of which "The People's Choice" is among the first, marks the beginning of a new era in the film industry. "Potentially, this event is as big as the advent of sound," declared Seaman before the premiere, "for we are pioneering a revolutionary development in the motion picture industry. We are not a major studio, and this is not an epic production, but we feel that this is a significant step in film history since we take a frame of film 5/8 of an inch in size, and project it on a standard-size theatre screen. It means that the 16-mm. industry has arrived, and through this medium will enable Hollywood to reach even the most remote places in the world. It will now bring screen entertainment to millions of potential fans in communities not being served by a regular theatre." He admitted frankly that "The People's Choice" is not a "big time" production, and that no pretentions of grandeur are meant. "We think of it merely as the first complete 16-mm. color program projected to a typical movie-going audience."



THE HIGH INTENSITY CARBON ARC LAMP (above) has two carbons automatically positioned by an electrical control system to maintain a uniform gap, to provide a light output of approximately 1,200 lumens, given a brilliant picture in a large auditorium. The full-wave rectifier used in conjunction with the lamp provides, from the usual 115-volt, 60-cycle a.c. line, a 28-volt direct current. The picture below shows the lamp cover opened.



THE CONTROL PANEL for the Filmoarc's sound system is shown in the bottom picture. In the controls, provision has been made for twin projectors and a twin speaker system. There is also a pair of jacks for two turntables and a pair for two microphones, permitting a wide range of use of the equipment. The variable voltage control permits uniformly efficient operation on voltages from 100 to 125. Sound changeover system is also included.



Present and Future of 16mm. Projection

Comparison of Present 16mm. Equipment With That for Future Professional Uses

E. W. D'Arcy
Chief Engineer, DeVry Corporation

It is the purpose of this article to present a discussion of the comparison between the present type of 16-mm. projectors and the type which will be produced in the immediate future to fulfill the demand for professional 16-mm. projection equipment.

Military Encouragement

Future development of professional 16-mm. projectors has received a tremendous impetus by the demands of the Armed Services for a more sturdy type of projector capable of withstanding inordinately bad field conditions, which demand culminated under Maj. Lloyd T. Goldsmith of the Signal Corps, who coordinated the various motion picture engineering groups in a common effort to produce a specification for a 16-mm. projector with professional quality.

This specification, with the implied interest of the Government in a high quality, 16-mm. professional equipment, has acted as a spur to the various manufacturers to evolve basically new designs of equipment with performance characteristics identical to those of professional 35-mm. equipment.

In addition, the financial support received through contracts from the Armed Services for the development of such equipment, as well as the certainty of being able to dispose of a projector made of high quality to discerning purchasers, has resulted in the solution of most of the problems incident to the achievement of performance as set forth by the Signal Corps.

A by-product of the development has been the production of adequate test film for checking projector performance, which has aided materially in the development of projectors to this specification. Therefore, we now have in the 16-mm. industry, test film that is the counterpart of that available for 35-mm. projection and this test film is available through the Society of Motion Picture Engineers.

Sixteen-millimeter film has been manufactured since 1925 in the silent version and has had sound added since 1930. The year-to-year improvement in sound quality justified, economically, further development work. Thus, 16-mm. sound quality has so improved that when the 35-mm. and 16-mm. versions are reproduced side by side, through identical amplification equipment, critical listeners cannot distinguish the difference in quality.

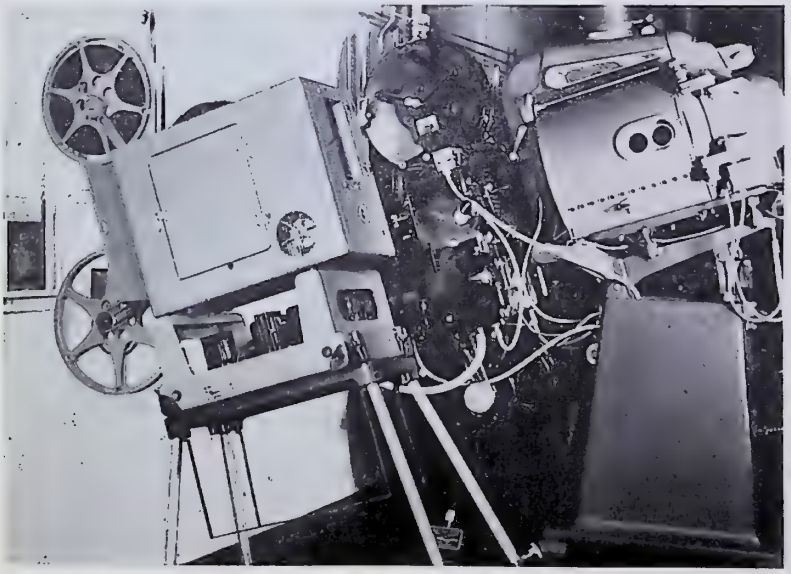
16-mm. Film Picture Quality

Picture quality also has steadily improved. As finer grade films have been developed, greater definition has been achieved. Color 16-mm. film preceded in many ways, and served as a proving ground for the development and testing of new color processes now being used. There is no longer any valid reason why 16-mm. film cannot be used for theatrical purposes, with a resultant saving in cost of handling, which in turn means more theatres and more projectionists employed in such activity.

Film damage is an important factor in 16-mm. operation. This cannot be assayed by the relatively high amount of damage done by non-professional personnel, since 16-mm. film as of this date has been generally supplied to educators and industrial concerns who demanded that the projectors be able to stop and present a frame of film, with disastrous results to that particular frame in still-projection conditions, or that the projectors be able to reverse the direction of film travel, with equally disastrous results to the film perforations. Automatic rewinds in addition have contributed to film damage when handled by inexperienced personnel.

The factor for considering 16-mm. film life, therefore, would be a life test of a loop of film through a projector test, which at this time has just about reached equivalency with the 35-mm. projector. We have consistently run test loops of film in 35-mm. projectors beyond 2,500 circuits; in fact, the average would be closer to 3,000 circuits, and generally, specifications for 35-mm. procurement state that it shall be possible to run a film loop for 800 circuits through the projector without excessive film damage. This is now possible on 16-mm. equipment and when handled by experienced projectionists, the same life span can be expected out of it as now exists with 35-mm. We have not yet reached projection light intensity values that would seriously damage 16-mm. film.

IN THE PROJECTION BOOTH of the Bay Theatre, Green Bay, Wisconsin, was installed this standard portable DeVry 16-mm. sound-on-film projector, with Mazda lamp, for the screening of a special film showing the activities of the renowned Green Bay Packers. The throw was 100 feet, at a 12-degree angle, for an 18-foot wide picture on the regulation theater screen. The standard DeVry 16-mm, amplification was ample for the 2,150-seat house.



SCREEN BRIGHTNESS RATINGS

Heretofore, 16-mm. projectors in the past have generally been Mazda-equipped and used as portable projectors. No 16-mm. screen brightness standards have been established similar to those set by the Society of Motion Picture Engineers of 10 plus 4 minus 1 foot-lamberts for 35-mm. equipment. This poses a considerable problem to 16-mm. producers, who have experienced great difficulty in timing of release prints for satisfactory use, what with the wide variations in screen illumination as a result of trying to achieve a maximum size picture, and projector variations in light transmission efficiency.

For our purposes of professional ratings, however, we shall use the SMPE standard of screen brightness for 35-mm. equipment, and, further to simplify the comparisons to follow, it is understood that they will be made with shutter stationary on an idealized basis of 60 per cent screen reflectivity and 60 per cent shutter transmission, no consideration being given to the variation in light out-

put with respect to lens focal lengths. By this method we arrive at the factor of a 28 foot-candles incident screen light as requisite for satisfactory projection. Presently the 16-mm. industry is far from this standard of screen brightness, the result of the essential portable non-theatrical use of 16-mm. units.

Mazda-equipped projectors vary widely in efficiency between the limits of 90 to 200 lumens of screen light (utilizing a 750-watt Mazda light source as standard). It can thus be readily understood that Mazda projectors are essentially portable units for amateur and semi-professional use with illumination standards far below that considered adequate for professional projection. Even assuming the most efficient of Mazda-powered light projectors, a screen size at 28 foot-candles is indicated as not exceeding 7.15 square feet, which would be picture width of 3¼ feet. Notwithstanding this comparatively low level of illumination very satisfactory performances have resulted to date in the fields where 16-mm. equipment has been mainly utilized.

ARC AND OTHER LIGHT SOURCES

At present only one manufacturer is making an arc lamp for 16-mm. projectors. This lamp is rated at 2,200 lumens output. Dividing these 2,200 lumens by our foot-candle factor of 28, results in 78.5 square feet of screen area, which in turn limits the projection width of the picture to approximately 10.5 feet. This is the maximum illumination obtainable at this time, although a new type high intensity carbon is in the offing having potentialities of doubling the present light output. This would mean 4,400 lumens, which, divided by the 28 factor, would mean a 157-square-foot screen image, or a picture 14.6 feet wide. This is meeting the most critical of illumination standards. Actually, we have successfully projected pictures with a much lower illumination level than this and have had satisfactory showings on 15-foot screens with the light source now available.

The ability of the film to withstand such heat has been established when infra-red filters are used, and there is no doubt but what future professional projection is a reality with this level of illumination. Also, at present arc carbons that will operate for 50 minutes are obtainable.

Two other light sources present themselves as distinct possibilities for high intensity 16-mm. projection: the General Electric capillary type and the Western Union crater source. Neither of these sources has approached as yet the intensity of the high intensity type of 35-mm. carbon arc, but they do offer distinct possibilities for competing with the present 16-mm. arc lamp.

Of primary importance to the projectionist is the type of intermittent movement used, its potential life, and its steadiness. 16-mm. equipment generally has been constructed around the shuttle or claw-type of movement rather than the familiar Geneva type movement as used in the 35-mm. projectors. The major determinate in this action has been the fact of the lower mass of film required to be moved, the requirement that the maximum period of rest be attained for film projection and the comparative costs of manufacturing which favor the shuttle movement.

GENEVA VS. SHUTTLE MOVEMENT

The 16-mm. projection, for the same picture size, the projected picture is appreciably higher in magnification than that in 35-mm. projection, thus necessitating a higher degree of precision in all of the intermittent movements. This becomes very expensive in the case of sprocket movements, which is registry repetitive and where the registry inaccuracies occur in the same order for each picture frame, thus resulting in a considerable manufacturing advantage leaning toward the shuttle movement. In addition, it has become standard 16-mm. practice to have a triple interruption of the picture during projection rather than the double one commonly used in the 35-mm. theatrical projectors. This immediately make compulsory a 60-degree intermittent movement at least for a 50 per cent transmission.

The Geneva movement, with which we are all familiar, is a 90-degree movement of inherent design limitations with respect to the preceding. This is due to the fact that the pin must strike the star slot at direct right angles in order to reduce impact to the minimum, thus affectively preventing any increase in the number of sectors to the star and increase in speed. In 16-mm. a very common type of movement would be a 40-degree type which cannot be duplicated in the conventional Geneva movement; therefore, 16-mm. sprocket systems are generally of the "drunken screw" type of movement somewhat similar to the Powers intermittent.

All of the preceding tends to establish the fact that a shuttle-type system is an accurate and easily produced type of intermittent, and it is possible by its use to achieve intermittent speeds requisite for maximum illumination conditions in projection. The shuttle movement utilizes a skip action—a double skip movement—meaning that the shuttle would be in engagement with the film in only once out of three up-and-down passages of the shuttle. This in itself is an inherent weakness of the shuttle movement as customarily used, since the wear on the shuttle, excluding film friction, is twice as great as if it were possible to have the shuttle moving with an accelerated speed but only at the rate of 24 times a second —the normal projection frame speed.

From the standpoint of the operating life of the two movements before service tension is required, the score is heavily on the side of the Geneva movement, since it is possible for them to operate for well over 1,000 hours without adjustment. The shuttle movements as now made do not last this long by a wide margin; therefore, relatively frequent replacements have to be made of these wearing members.

Then, too, the shuttle movement is not in engagement with the film during the complete progress through the projector; therefore, film that is damaged has less chance of satisfactory projection in the shuttle than in the sprocket projectors. However, there will doubtless be 16-mm. projectors in the future for professional use which will utilize both methods of film movement, and since the advantages and disadvantages are rather evenly matched, it would seem that, depending upon production accuracy, either type can give an adequate professional performance in terms of film life.

PICTURE STEADINESS; MOTOR DRIVES

The question of picture steadiness is also of direct interest to professional users of 16-mm. equipment. Improvements have been steadily made in this factor so that professional standards with regard to jump and side weave are satisfactory up to the limit of the illumination sources available presently.

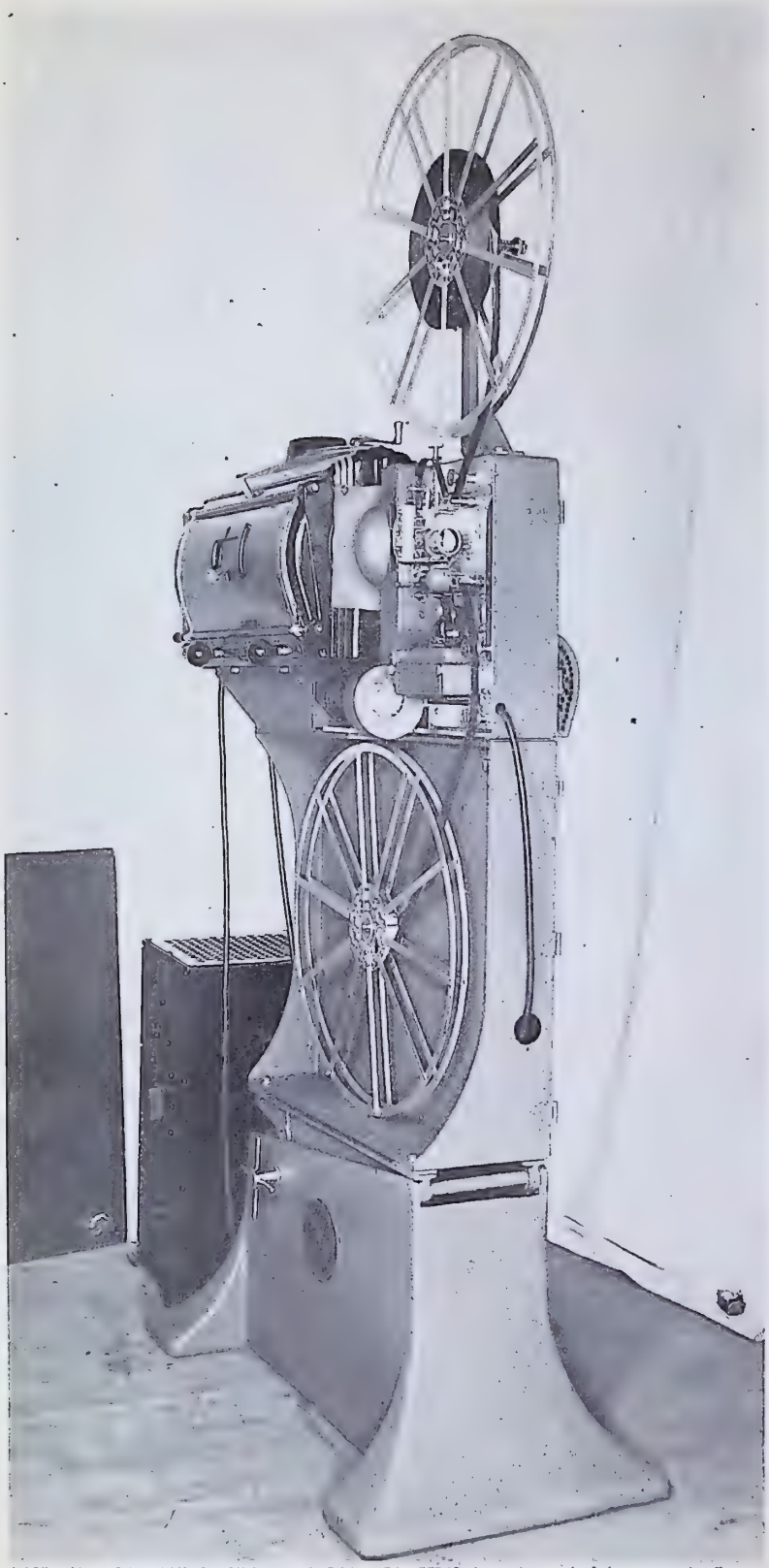
Current 16-mm. projectors utilize universal governor regulated type motors for power, since they are generally required to meet field conditions of varying voltage and frequency that would render inoperative the standard type of induction motor. In addition, the projectors are lightweight, portable affairs wherein weight is at a premium. This will not be the case with the theatrical type of 16-mm. projector, which will be mounted on a fixed base; also, the motor is designed to run in only one direction, and rewind, reversing and stop-on-film features are eliminated. The average 16-mm. projector now requires up to 1/10 h.p. for power, which requirement is not vastly different from that for 35-mm. projectors with the standard Geneva movement. Therefore, future theatrical 16-mm. machines will undoubtedly be equipped with the conventional type of heavy-duty induction motor.

Sixteen-millimeter equipment has had one advantage over 35-mm. equipment in that when 16-mm. was developed it was not an addition to a silent projector but an entity within itself—both sound and picture. This permitted a most economical and compact combination of sound and picture into one mechanism head, and future 16-mm. projectors will no doubt all be of this type.

PROJECTION OPTICS

Present 16-mm. projectors are generally inherently prevented by their design from using lenses of the same speed in all focal lengths. This is due to mechanical clearance considerations only, which will be remedied in future models to accommodate the American Standards Association lens barrel specifications. Generally, all lenses now supplied for 16-mm. projection are coated lenses, the speed of which is much higher than that heretofore considered as standard. Coatings now applied are durable, and when full advantage is taken of the reduction in stray light from the coating by suitable internal non-reflecting treatment, pictures of excellent contrast and sharpness result.

When 16-mm. had sound applied to it, a decision was reached that the speed ratio be set as of the order of 2½:1 with reference to film travel at 90 feet, making a lineal speed of 36 feet a minute. Consideration was given to the making of 16-mm. prints by optical reduction methods from the standard 35-mm. negatives. Since a 2½:1 reduction in sound-track width would effectively reduce the track width, if followed in this order, with a resultant increase in signal-to-noise level due to the relatively narrower track scanned, a reduction was set of 85 per cent for the sound track width. This



A PRE-WAR MODEL OF THE DeVRY 16-MM. ARC LAMP PROJECTOR shows the trend of the company's efforts to develop a sturdy projector especially for the commercial theatre market. The projector's magazines will hold 4,000 feet of film, the equivalent of 10,000 feet of 35-mm. film, and affords 1¾ hours of continuous screen time. The arc lamp is designed to be capable of filling a 24-foot theatre screen, with a throw of 125 feet or more.

then has resulted in a 16-mm. sound track of a standard width of 0.06 inch.

Cylindrical Reduction Systems

Considerations of portability generally have resulted in the selection of a cylindrical reduction lens system for 16-mm. projectors, whereas 35-mm. systems utilize the mechanical slit with a low-voltage, high-current exciter lamp. The 16-mm. exciter lamp for the cylindrical reduction system most widely used is the 4-volt, ¾-ampere type, which generally (again for portability reasons) has been supplied by a well-filtered high-frequency current generated in an amplifier, the frequency of which has been upwards of 20,000 cycles. Since the exciter lamp has been so small in current and power capacity, a higher lamp standard for the selection of lamps has had to be set; even so, exciter lamp microphonics and troubles have been much more numerous in 16-mm. than in 35-mm. equipment.

16-mm. Professional System

The cylindrical reduction system, however, inherently has a higher efficiency than that of the mechanical slit and such a system, utilizing the 6-volt, 1-ampere pre-focus exciter lamp, has been in use in DeVry 35-mm. equipment for the last six years. This lamp is more rugged than the smaller one and has demonstrated its ability to withstand theatrical usage over a long period of time. A 16-mm. cylindrical reduction system has been evolved utilizing this light source and has proven itself completely satisfactory with regard to microphonics and exciter lamp defects. We may find in the future, then, 16-mm. professional projectors utilizing either of these systems—the cylindrical reduction system or the mechanical slit type. In relation to performance, they are almost identical it now being possible consistently to produce scanning beams of 0.00075 inch in section. This has made possible 16-mm. performances almost identical to that of the 35-mm. equivalent up to 6,000 cycles. At frequencies above this, 16-mm. units drop off rapidly.

Now, as to performance, a 16-mm. standard for scanning has been established by the specification mentioned previously and approximates closely that of the Academy of Motion Picture Arts and Sciences. This standard provides that scanning efficiency shall be such that, without reprinting the curve, the slit loss shall not exceed 5 db. at 6,000 cycles. This has been realized and, as stated previously, the final listening results are so closely identical to 35-mm. results, that a trained listener can hardly discern the difference when two tracks are reproduced comparatively. This is true of fresh film only. When subjected to field distribution, 16-mm. obviously is inherently liable to a higher surface noise from damage in handling and the likelihood of obliteration of higher frequencies than 35-mm. film.

The lower lineal speed of 16-mm. film presents a more severe problem in the reduction of flutter than that encountered with 35-mm. film and it therefore becomes a problem of high prevision in the reduction of film flutter through the selection of bearings and the choice of the mechanical filter system. This has been solved, and future 16-mm. theatri-

cal projectors will have speed variation not in excess of that permissible for 35-mm. sound reproduction. In fact, the flutter as measured on the RCA type of flutter meter has been reduced in professional 16-mm. equipment to between 0.2 and 0.3 per cent.

Frequency-Response Standards

When prints are released to a standard frequency specification, no fundamental differences exist with regard to the amplification system as between 16-mm. and 35-mm. Prints are not standard with regard to their release characteristics presently, however, and a standard is being formulated for such professional use.

The past portable nature of most 16-mm. projection equipment, with the wide variation in response characteristics, as released by various producers, when coupled with the bad acoustical conditions involved generally, has made mandatory the use of tone controls which could be adjusted, thus compensating for poor conditions.

For theatrical usage, tone controls cannot be tolerated, and once a theatre amplifier is adjusted for best reproduction, it is to be assumed that print quality will be maintained to a standard as selected, without necessitating any theatre adjustment of the system.

The aforementioned variations in frequency response characteristics, as used by the producer, has reacted very badly with regard to general showings, and this, coupled with the essential portable nature of the loudspeaker systems, has prevented high quality 16-mm. reproduction.

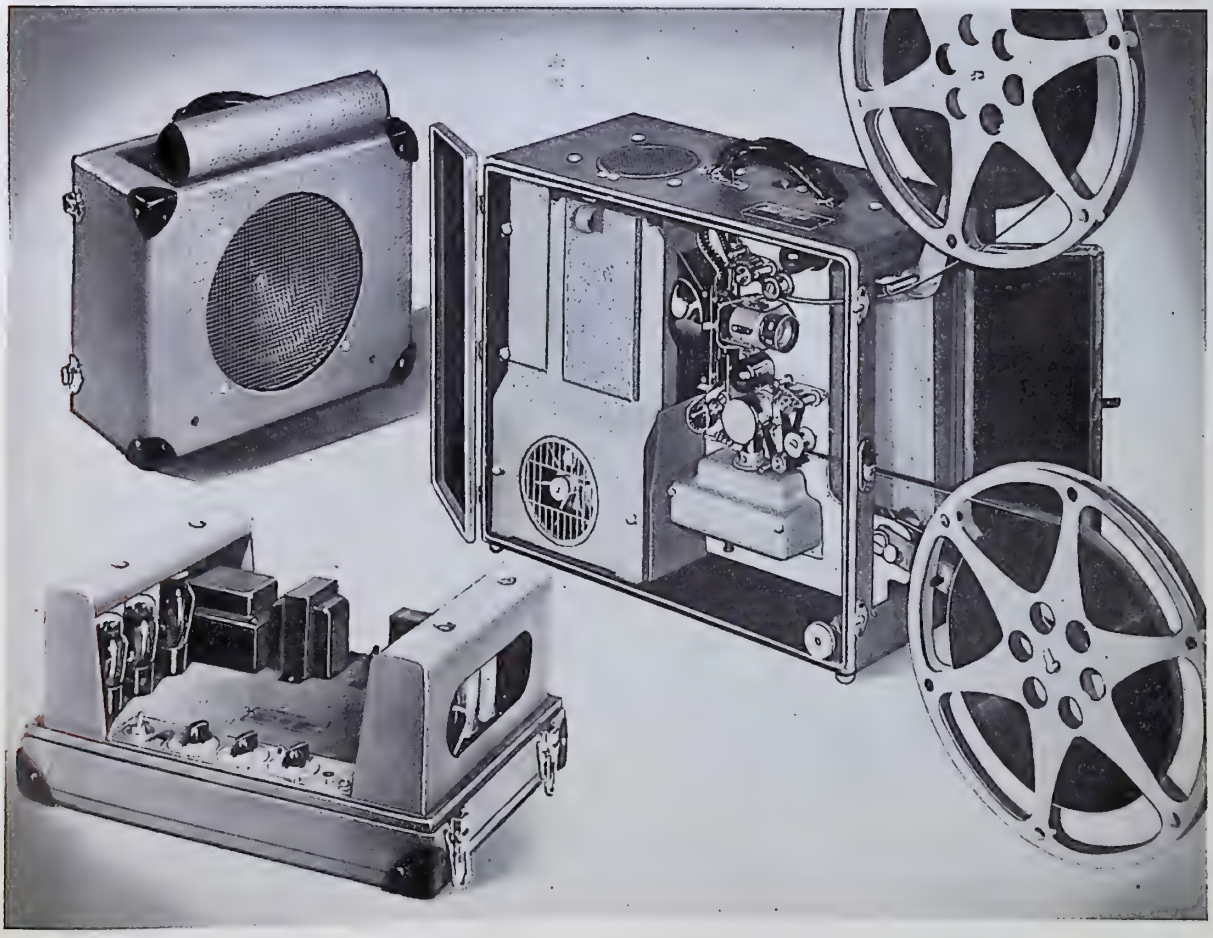
Understandably, with an improperly baffled loudspeaker, plus the tendency of many users of portable equipment to accentuate the low frequencies, the end result has been very high factors of intermodulation distortion in the output from the speakers and overloading of amplifiers. When 16-mm. film is recorded properly to take advantage of correct standard reproduction, and the amplification system is terminated in a correct speaker system of theatrical quality, a vast difference is immediately realized in professional potentialities.

Portable amplifier equipment generally has been based on very liberal distortion allowances. For example, the RMA rating of amplifier distortion allows amplification systems to be rated as to the very maximum power obtainable from an amplifier, excluding the factor of distortion, and this, combined with the seldom mentioned factors of power output at 5 per cent distortion level, represents the type of amplification generally supplied with 16-mm. equipment in the past. Professional sound reproduction equipment should have, and will have, the same low distortion level as for theatre equipment recognized as standard at this time, which in essence is not to exceed 2 per cent over the frequency range covered.

CONCLUSION

This discussion of the present and future of 16-mm. equipment has, of necessity, been a very abbreviated one, but the writer hopes that it has clarified many current questions anent professional 16-mm. projection. Obviously, 16-mm. equipment will not replace 35-mm. in the main, due to inherent limitations of illumination where large screen sizes are involved; but it is certain that it will furnish a valuable secondary theatrical market and one which will be very successful if professional personnel is used in the operation of the equipment.

THE DeVRY MODEL RS-ND30 PROFESSIONAL 16-MM. SOUND-ON-FILM PROJECTOR is the currently available one. The projector is in one case, the 30-watt amplifier and 12-inch permanent magnet speaker in another. The projector utilizes a 750-watt lamp (interchangeable with a 1,000-watt lamp) and a coated 2-inch f/1.6 lens. Lenses of other focal lengths can be interchangeably as desired by the operator. The film capacity is 1,600 feet. The power consumption of the projector with the 750-watt lamp is about 1,000 watts. The projector can be used sound or silent and with black-and-white or color, and the p.a. system indoors or outdoors.



The Motion Picture in Public Conveyances

General Discussion of the Possibilities Using 16-mm. Entertainment for Travelers

The accompanying generalized discussion is embodied in "The Motion Picture in the Public Conveyance" published by the Bell and Howell Company. Permission to reprint (with some authorized revisions and revised figures) has been granted by the company, Margaret Ostrom, sales promotion manager.

The trend toward wider use of motion pictures for recreation in the home and elsewhere demands that we visualize their use in commercial passenger transportation. Already tested with highly gratifying results, the use of motion pictures for passenger entertainment is on the threshold of tremendous growth.

It follows naturally that the quality of the recreational presentation must be in line with the high standards set by the railroad, airline, or bus company in other phases of passenger comfort and convenience.

The time has come when common carriers are being designed to include motion pictures for passenger recreation. Any sensible approach to the matter requires a careful consideration of all its phases.

The following treatise has been written expressly to assist and guide, and to explain how motion picture projection equipment can be installed, used, and serviced to the best advantage in carriers of various types, where space is at a premium.

An attempt to go into any considerable detail regarding actual installations would be impractical here.

It is hoped that this treatment of the matter will suggest a definite way in which there can be initiated a program of passenger entertainment which will result in additional business and goodwill for transportation companies, as well as increased pleasure for their patrons.

THE "THEATRE"

In considering a program of installation to bring movies into the public conveyance, a basic factor is the seating arrangement. Every member of the audience must be able to see and hear the program clearly.

Seating space on common carriers is more or less static. This fact renders the relationship and location of projector, screen, and loud speaker especially important.

To provide the designer with some of the facts regarding the advantageous disposition of space and equipment, two distinct methods of projecting motion pictures will be described briefly: Front projection and rear projection.

FRONT PROJECTION is recommended when the projector can be suspended from a small platform above the heads of the passengers near the center of the vehicle or above the heads of the attendants inside the service enclosure. The distance from projector to the screen will be between 10 and 25 feet. In an average installation of this type, size of the screen image will be 44 inches wide by 33 inches high, or approximately these dimensions.

FRONT PROJECTION

Location of Equipment

Front Projection is the type most commonly used, being customary in theatres, lecture halls, homes, and schools. A suggested front-projection installation is shown in the accompanying sketch. The projector is located in front of the screen and behind the audience. A screen, which may be of the glass-beaded-surface type, reflects the image thrown by the projector. The width of the screen, for ideal conditions, should be approximately one-sixth of the distance between projector and screen. The row of seats nearest the screen should be about two and one-half times screen width distant from the screen.

It is recommended that the screen be located so that it is as high as possible above the floor of the conveyance, in order to prevent obstruction of the light beam by the audience. Installation of a sliding panel in the end wall, with the screen permanently placed, is suggested. When installed in this manner the screen can be recessed several inches, so as to produce a "shadow-box" or screen-darkening effect for better image visibility under semi-darkened conditions.

Support and Placement

For front projection it is recommended that the projector itself be suspended from a small platform above the heads of the passengers near the center of the car or above the heads of the attendants inside a service enclosure as indicated in the sketch. Distance from projector to screen thus will be anywhere from 10 to 25 feet. In an average installation of this type the size of the screen image produced will be 44 inches wide by 33 inches high, or thereabouts.

Various lens-to-screen distances and lens focal lengths can be utilized to produce screen images of various sizes at be computed readily, to suit your exact space requirements, by consulting Table 1, Projected Picture Sizes Obtained with Filmo Projection Lenses.

It will be necessary to suspend the projector rigidly from the ceiling on a

platform whose top surface lies at least 40 inches below the ceiling. The platform should be capable of supporting at least 55 pounds of weight. A suggested support arrangement is indicated in Figure 2: the platform is a sheet of 10-gauge steel, 30 x 12 inches in size, which is supported by four lengths of ½-inch steel tubing.

For purposes of planning and design, it is pointed out that the approximate weight of the Filmosound projector (without speaker) is between 50 and 53 pounds, outside dimensions being 36 x 28 x 9 inches.

Where the projector is placed in the passenger area of the car rather than in the service compartment, storage facilities and appearance can be enhanced by designing the platform in such a way that it will form a part of the ceiling when not in use. Provisions could be made to raise and lower the platform silently and quickly at the beginning and end of a showing.

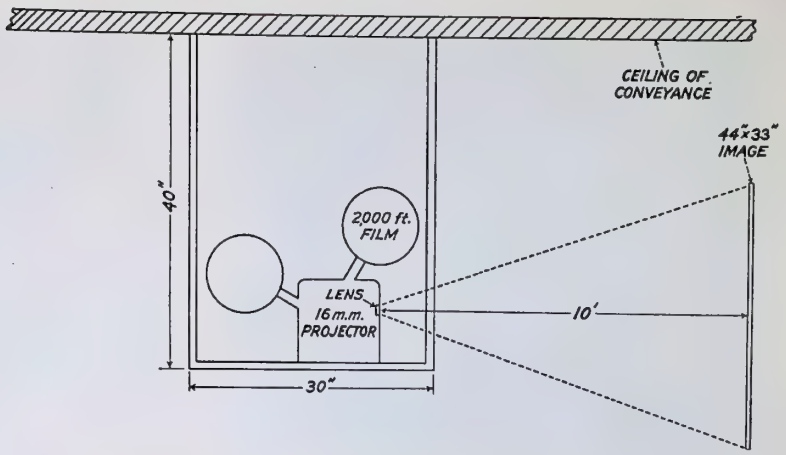


FIGURE 1—A suggested front-projection installation is shown here. The projector is located in front of the screen and behind the audience. A screen, which may be of the glass-beaded-surface type, reflects the image thrown by the projector. The width of the screen should be approximately one-sixth of the distance between the projector and the screen. The row of seats nearest screen should be not closer than two and one half times the screen width.

Table 1—Projected Picture Sizes Obtained with Filmo Projection Lenses

Lens Focal Length 16mm Projector	Distance in Feet from Screen to Film — Width and Height of Picture				
	8'	10'	12'	15'	20'
¾"	0'11"	4'11"	7'6"	9'11"	12'6"
	2'11"	3'8"	4'5"	5'7"	7'5"
1"	2'11"	3'8"	4'5"	5'7"	7'5"
	2'2"	2'9"	3'4"	4'2"	5'7"
1½"	1'11"	2'5"	2'11"	3'8"	4'11"
	1'5"	1'10"	2'2"	2'9"	3'8"
2"	...	1'10"	2'2"	2'9"	3'8"
	...	1'4"	1'8"	2'1"	2'9"
2½"	...	1'5"	1'9"	2'2"	2'11"
	...	1'1"	1'3"	1'8"	2'2"

The Speaker

While in some cases one speaker may suffice, it is recommended that two speakers be used for best results. These can be installed in or on the ceiling or it might be desirable to place one speaker below the screen and the other in the ceiling.

REAR PROJECTION

As distinguished from front projection, rear projection has much to commend its use in passenger vehicles where semi-darkened conditions prevail. In this discussion, rear projection is taken to mean a system whereby the projector is placed behind a translucent screen and the image is viewed through the screen from in front of it. Obviously, a major advantage here is that the audience is never located between projector and screen where interruptions of the light beam may occur.

The artist's sketch shows how the rear projection screen might appear when viewed by passengers.

Location of Equipment

To house a rear-projection unit, including projector, mirrors, and screen, a compact booth can be constructed just inside the steward's compartment.

The accompanying drawing serves to illustrate simply how rear projection works. The beam of light from the projector is aimed onto a mirror, A, thence through a translucent screen, B. The mirror employed in this system is front-surfaced, affording high reflectivity and very little loss of light. It should be installed permanently and rigidly.

The Speaker

For a permanent installation in a small interior the speaker can be built right into the rear-projection unit. We recommend, however, that in most instances the dual-speaker arrangement previously described be utilized. In any case, there should be provision for controlling sound volume from outside the rear-projection booth as well as inside it.

Advantages

Without attempting to evaluate the desirability of either front or rear projection in any given instance, it is felt entirely proper to point out the following advantages of rear projection in the field of transportation:

(1) Saves space, which always is at a premium on public conveyances.

(2) Projector is protected considerably from dust and dirt.

(3) There is no mechanism, platform, or beam of light to interfere, or

REAR PROJECTION has much to commend its use in passenger vehicles where semi-darkened conditions prevail. Here rear projection is taken to mean a system whereby the projector is placed behind a translucent screen and the image is viewed through the screen in front of it. A major advantage is that the audience is never located between projector and screen, where interruptions of the light beam may occur. Here is how it might appear.

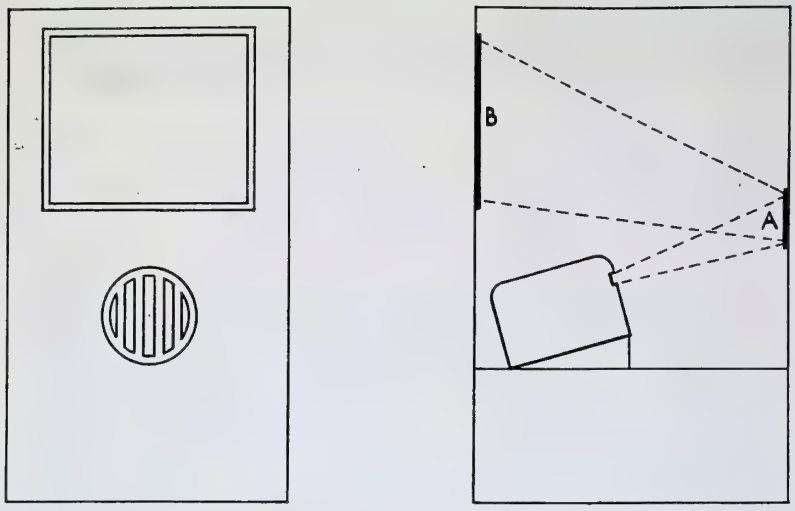


FIGURE 2—Diagram of the rear-projection cabinet, the front view at the left, the side view at the right. The cabinet is about 45 inches wide, 48 inches deep, and 77 inches high. In the side view, A, is the mirror that reflects the picture to the viewing screen, B, thus insuring that they are seen in their natural position, not reversed. Being completely enclosed, the projector is quite protected considerably from much of the ever-present dust and dirt.

WHILE 16-MM. FILMS have long been used in training, their use in vehicles, to save time, is something new. Above is an Illinois Central System dining car equipped with Bell and Howell Filmsound projectors. Below shows the Philadelphia Eagles reviewing a game's movies (made by News Reel Laboratory) while traveling by Transcontinental Western Airplane. A Bell and Howell Filmo (silent) projector is used in this method of review.

be interfered with, in the passenger area of the conveyance.

(4) Located within its booth or enclosure, at normal height, the projector is easier to thread, operate, service, and repair.

ELECTRICAL SPECIFICATIONS

The standard Filmosound projector is designed to operate on 115-volt a.c. Electrically, the projector consists of three components; the motor, which drives the film moving mechanism; the projection lamp, and the amplifier. The motor and the lamp can be connected to 115-volt alternating or direct current power sources, but the amplifier must be fed from alternating current sources only.

Since the larger power consuming elements, the lamp and motor, can be connected to alternating current, the Filmosound incorporates one input receptacle for these two components and another input receptacle for the amplifier. Thus, if only direct current is available, the projector motor and lamp can be connected directly to the d.c. source and the amplifier to a small converter.

If the Filmosound is to be operated on voltages lower than 115 volts, special low-voltage lamps are available. The light output of these special lamps will be less than that of the 1000-watt lamp. Provisions can be made for operating the motor and amplifier on the lower voltage.

SELECTION OF EQUIPMENT

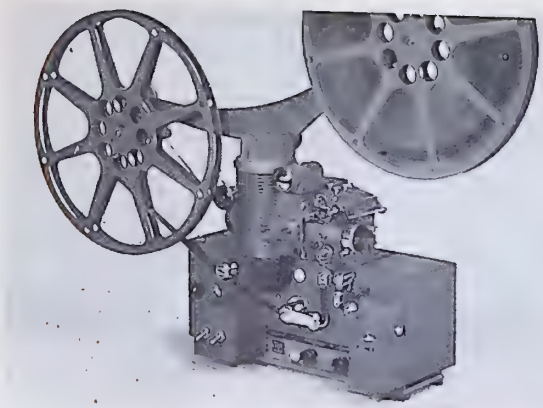
Any comprehensive program for presenting motion pictures to audiences en route must take into account the construction, operation, maintenance, and dependability of the equipment, not to mention the advantageous booking of interesting and up-to-the-minute films.

The battle-tested Filmosound models now available are the result of Bell and Howell Company's careful basic engineering and patents, plus a world of experience gained in making equipment to fill the Armed Forces' stringent wartime requirements. Successfully designed and built to withstand all sorts of climate and unbelievably difficult conditions of operation and maintenance, today's Filmosounds are certain to serve well in the field of transportation.

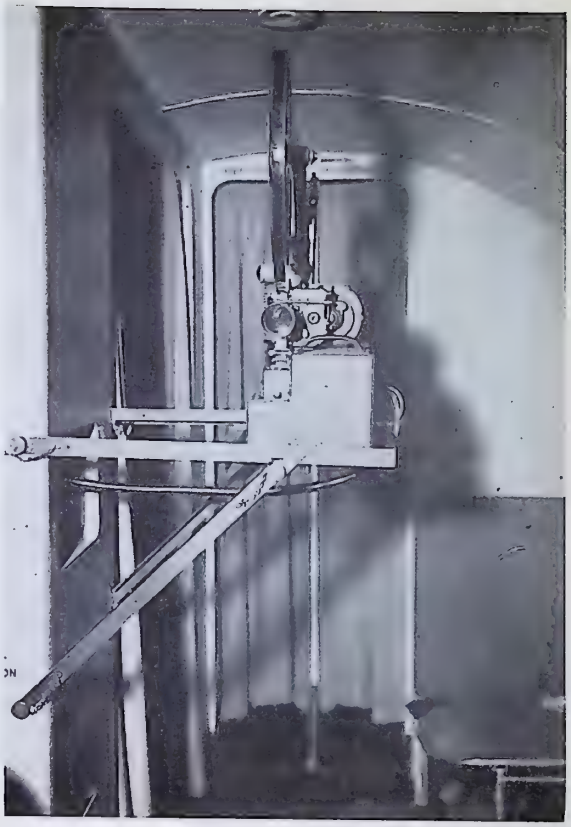
No less important is the fact that every Filmosound is sold with the thought in mind that authorized Bell and Howell industrial dealers and special representatives are located through the country, and that it is the assumed obligation of each of these specialists to keep every Filmosound in his territory operating perfectly at all times.

Indeed, it is to the distinct advantage of each of these veterans in the field to service Bell and Howell equipment, a fact which is just that much more assurance that your passengers will enjoy good and uninterrupted entertainment en route.

Bell and Howell Company furthermore operates an Army-and-Navy accredited training school at which your operating personnel can obtain factory schooling of the most thorough kind—and in a few weeks—in operating and repairing sound motion picture equipment.



THE PROJECTOR (above) operates off the plane's regular 24-volt direct current, requiring specially designed lamps, amplifier circuit, and motor. A series of small speakers (below), spaced along the ceiling, assures ideal distribution of sound despite the peculiar acoustical conditions encountered in the cabin of the plane.



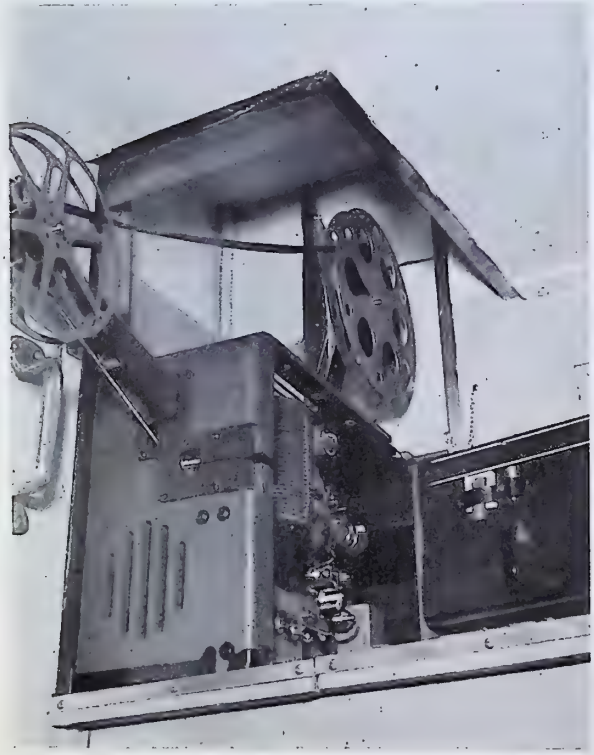
THE AIRBORNE PROJECTOR, developed by the Bell and Howell Company for use on the Pan American World Airways System's Constellations, is supported by means of collapsible brackets and a folding shelf, attached to the water cooler at the rear of the cabin. When not in use, supports are dismantled and stowed away.

CONVERTED TO A THEATRE, the Constellation's passengers, while 15,000 feet up in the air and traveling at 300 miles an hour, participate at the world premiere of Universal's "So Goes My Love." From Shannon Airport, the plane's Captain O'Connor radioed his home office, "Passengers report sound and picture reproduction excellent. Filmosound projector functioned perfectly." It is expected that it will not be long before airborne movies will be the usual thing, especially on long-distance flights. (All photographs on this page are employed through the courtesy of Pan American and the Bell and Howell Company.)

THE THEATRE THAT TRAVELS 90 MILES AN HOUR was suggested by the American Locomotive Company as a new development. Shown here is the Alco artist's conception of a club car converted into a motion-picture theatre, where passengers may relax in a luxurious lounge and enjoy the latest releases while traveling.

RAILBORNE MOTION-PICTURE ENTERTAINMENT became a reality when the Chesapeake and Ohio Railway Company inaugurated the service on the George Washington, running between Norfolk and Cincinnati. Above is the diner in normal operation, while below shows the car transformed to a 16-mm. rolling theatre. Screen is mounted on ceiling brackets and braced from the rear to the car wall.

THE CANADIAN PACIFIC's mobile training program includes a special safety inspection car, which is sent from place for instruction in the principles of railroad operation. The instructor uses (right) electrically lighted replicas of signals and a 16-mm. sound-on-film projector for descriptions and explanations. The Bell and Howell Filmosound projector (left) is mounted at the rear and above the heads of the audience in an enclosed projection booth. Numerous outlets permit the plugging in of microphones for round-robin discussions between instructor and students. A ceiling-type screen is used in the instruction car. (Courtesy B&H.)



Brief Review of Modern Business Theatres

Auditoriums and Conference-Display Rooms Equipped to Show Companies' 16-mm. Films

Showmanship in business begins at home. The company auditorium, assembly hall, or theatre—call it what you will—has come to mean more than mere showmanship to many leading United States and Canadian manufacturers who have provided such facilities.

Paying dividends in community and employe relations, as well as management efficiency, are such well-known plants as the National Cash Register Company Auditorium at Dayton, Ohio, the theatre of the E. I. duPont deNemours and Company at Wilmington, Delaware, the ultra modern theatre by Frank Lloyd Wright for the S. C. Johnson and Son, Inc., plant at Racine, Wisconsin, and similar layouts for Eastman Kodak Company; Hershey Chocolate Corporation; Caterpillar Tractor Company; Bell and Howell Company, and General Motors Corporation.

COMPANY FILM PREVIEWS

A company film preview is a selling job. The product must be presented smoothly. Suppose, for example, some telephone customers have Grade A service and others Grade B service. Conditions are as we know them in Grade A—neat, orderly installations and a minimum of exposed equipment and operational noise. Grade B service is just the opposite. Wiring is exposed on floors and ceilings and repairmen are forever tinkering on equipment as calls are made. Disturbing switching noises can be heard in every conversation.

How far would a telephone company go with Grade B service in a long-range program, Not very far. The same comparative decision is reached when a film selling job is attempted with Grade B projection facilites.

If a film preview is amateur with box-top projection, hit-or-miss seating, floor-strewn cables and devil-may-care sound, you can be sure these factors add up in the box score of reaction.

Why must films be sold?

First, a preview is a sampling test. Conscious of it or not, the audience group draws a comparison with high quality theatrical reels of the entertainment field. Sight, sound and the sometimes ignored third factor—atmosphere—are registering at almost every frame. Reaction is made up of a lot of little things. Ragged edges in presentation are just so many performances in the whole cloth of viewpoint.

"Yes, but the content of the film should sell itself, regardless of external conditions," says one school of thought. Perhaps, but even the diamond merchant does a good polishing and setting job before merchandising his best gems.

The present discussion of business theatres, excepting that of the Gaucho Theatre, is a digest from the business and educational sections of Audio-Visual Publications' Business Screen and See and Hear, to which, for further information, the reader is referred.

The idea of films for employees and the public needs little selling today. What is needed, however, is a purposeful effort to find application for each worthwhile film.

SOME BUSINESS THEATRES

New designs in business theatres reflect the growing interest of industry in obtaining the most efficient motion-picture and sound slide-film audience facilities available. Many corporation, large and small, are building new theatres, revamping existing ones, and striving to give the field of audio-visual communications the best possible environment. Postwar construction and expansion programs, although retarded, have given firms an opportunity to build auditoriums, projections rooms, and theatres which are based on latest materials, acoustical and lighting data—data which were not available 10, 15, or 20 years ago when many of the existing plans were built.

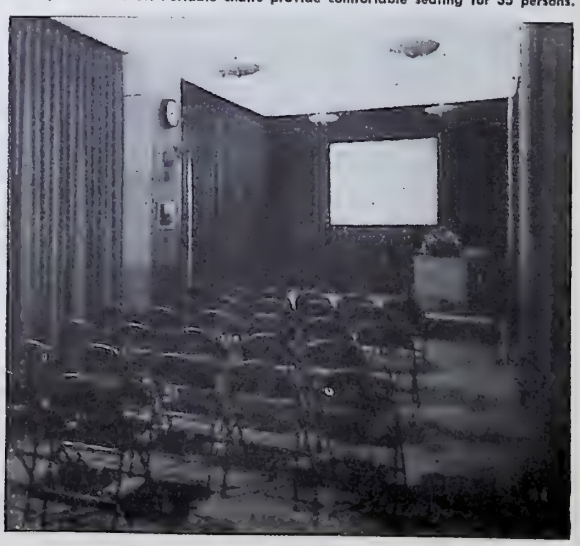
The trend is definitely toward eye-pleasing rooms, with all-round visual potentiality, which allows for the most effective use of films in employe training, inspirational work, or customer relations.

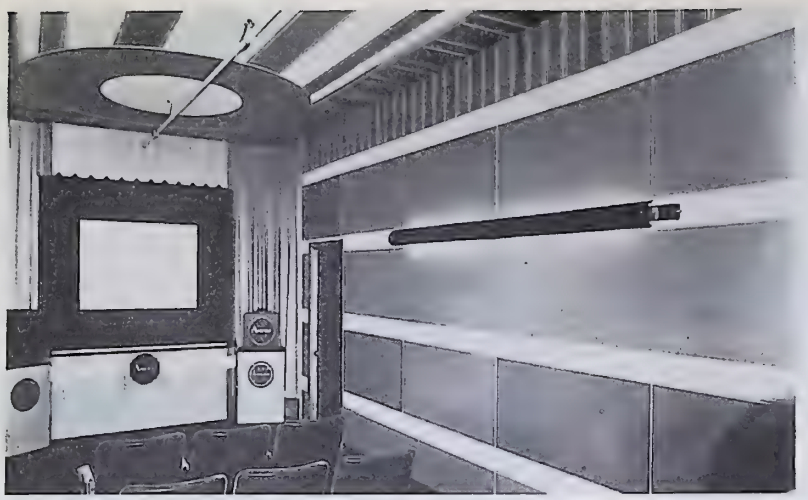
In the following sections are brief discussions of some of the better business theatres of recent years.

Ampro

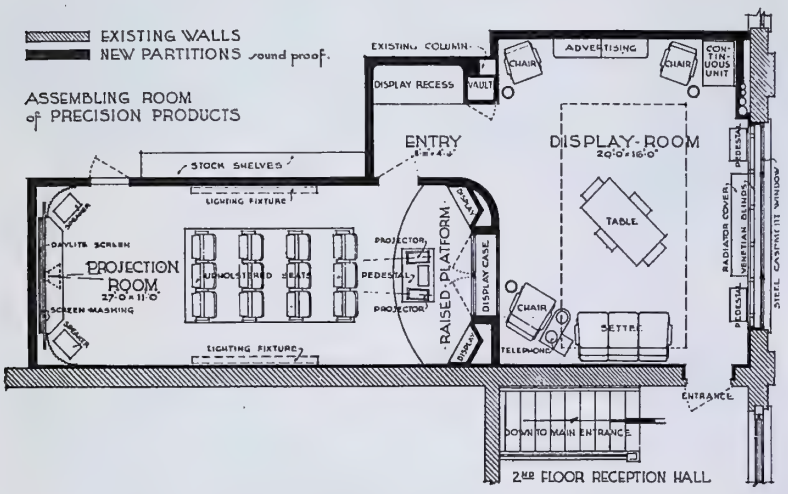
Here is an ideal layout for a small preview room in the agency training department or advertising offices. Good use of decorative and yet functional

IN THE ILLINOIS BELL TELEPHONE COMPANY'S THEATRE, the ceiling was exceptionally high. Large columns ran through almost the center of the room. Wall partitions were of metal and glass. Decorating helped overcome these objections. A four-shaded green on the walls helped to bring down the ceiling. Drapes on three sides of the room halted most of the bouncing sound. Sound-proofing material on the ceiling completed the softening. Placement of seats, screen, and projection booth in off-center fashion avoided the several cumbersome columns and provided a draped-in corridor. Portable chairs provide comfortable seating for 35 persons.

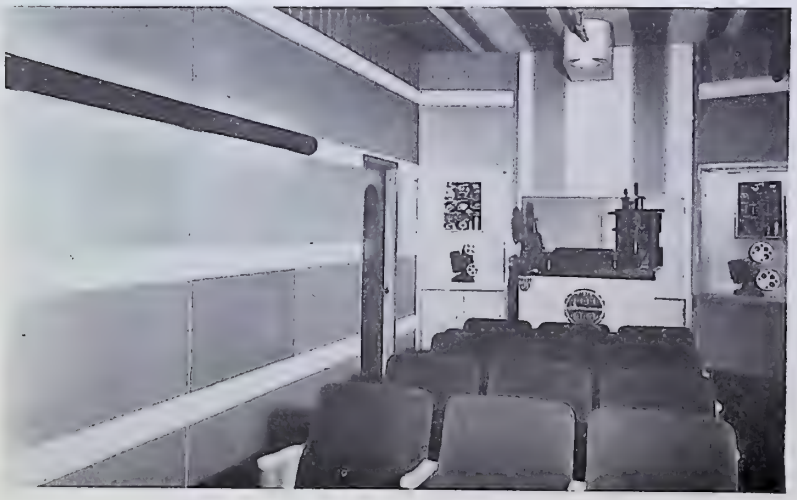




AMPRO CORPORATION has a near-ideal layout for a small preview room in the agency training department or advertising offices. Above is the screen end of this 12-seat theatre, and immediately below is the floor plan, showing how a theatre of this type can be designed and constructed in existing buildings. Good use of decorative and yet functional sound-proofing materials and effective small stage setting for the picture screen are featured.



PERMANENT THEATRE-TYPE CHAIRS (below) worked out best for the Ampro Corporation. Wiring to speakers at the front of the room is well concealed. Ventilation is provided in the windowless space by air-conditioning vents. Indirect lighting fixtures provide adequate illumination which is controlled by the projectionist. Floor covering is linoleum with a decorative inlay to establish aisle areas. The materials used in this little theatre are not costly.



sound proofing materials, and effective small stage setting for the motion-picture screen, and a combined display and preview room are featured.

Ampro Corporation, in whose modern factory building these accommodations were built, has since redesigned the room, but the original pattern remains little changed. Here again, permanent theatre-type seats worked out best. Wiring to speakers at the front of the room is well-concealed. Ventilation is provided in the window-less space by air-conditioning vents. Indirect lighting fixtures provide adequate illumination and controlled by the projectionist.

Flooring is linoleum tile with decorative inlay to establish aisle areas. Materials involved in this design are not very costly; when readily available they will make a preview room a must for every progressive film sponsor.

Benjamin Electric

Typical of the newest designs in plant layout and business theatres is the Product Department and Testing Laboratory of the Benjamin Electric Company, Des Plaines, Illinois.

Built at a cost of $100,000 it was dedicated in June, 1946, on the occasion of the company's 45th anniversary program, and is a part of a three-year plan for landscaping the grounds and modernizing the entire plant layout. Perkins and Will, school building specialists and lighting consultants, were the architects.

In addition to the prime purpose of the building, which is to house the laboratories, the building also serves as a reception center and conference and educational meeting place.

An air-conditioned conference room provides facilities for engineering and sales meetings, foreman's meetings, and other group conferences. Primary use for the room will be as a classroom for conducting sales-training short courses of electrical wholesalers.

Illinois Bell

In the Illinois Bell Telephone Company, launching new films became a major project shortly before the war. It is still growing. Morale subjects for employees, entertainment features, job training films, specific subjects for specific problems—all are needed and requested.

Previews numbered many each week, but quarters for showing films were hopelessly inadequate. A small office served as clearing house for all projection and lecture-demonstration equipment. Maintenance and distribution work on all activities had to be stopped each time a showing was presented. Projection facilities were temporary in set-up—the same equipment moved out for field shows almost daily. Seating capacity was low with a "house" of ten almost filling the available space.

Relief came in the form of a new location for the lecture-demonstration activity. For the first time, quarters became available for use solely in the movie activity. Situated in one of the older buildings of the downtown Chicago group, the movie headquarters are near all other central buildings.

The first move in expansion was the

extension of walls into a large corridor one way and into adjoining quarters in the other direction. Thus, the motion picture headquarters started with a space of 52x21 feet. Part of this, an area 21x12 feet, was designated for office and storage space. The balance became the "studio."

There were certain problems of design. The ceiling was exceptionally high. Large columns ran through almost the center of the room. Wall partitions were metal and glass—a harsh combination for sound.

Decorating helped overcome some of this. A four-shaded green on the walls helped "bring down" the ceiling. Drapes on three sides of the room halted most of the bouncing sound. Soundproofing material on the ceiling completed the "softening." Placement of seats, screen and projection booth in off-center fashion avoided the cumbersome columns and provided a draped-in corridor from the booth to the studio office, allowing exit and entrance without disturbing the audience. Portable chairs provide comfortable seating for 35 persons.

At the end of the room a perforated screen was mounted on the wall with space for four loudspeakers behind it. A portable platform was placed on the floor before the screen.

A concrete-tile projection booth was erected at the opposite end of the room. With its walls and ceiling entirely sound-proofed and glass window openings, the booth has equipment for dual movie or slide projection. A monitor speaker in the booth enables the operator to adjust volume controls to the best audience levels. Built-in conduit carries loudspeaker circuits and microphone channels for recording work.

The studio office serves as the film and equipment center for the movie activity. Maintenance, distribution, and film editing work is handled there. Equipment is checked and shipped to the company's five divisional film centers.

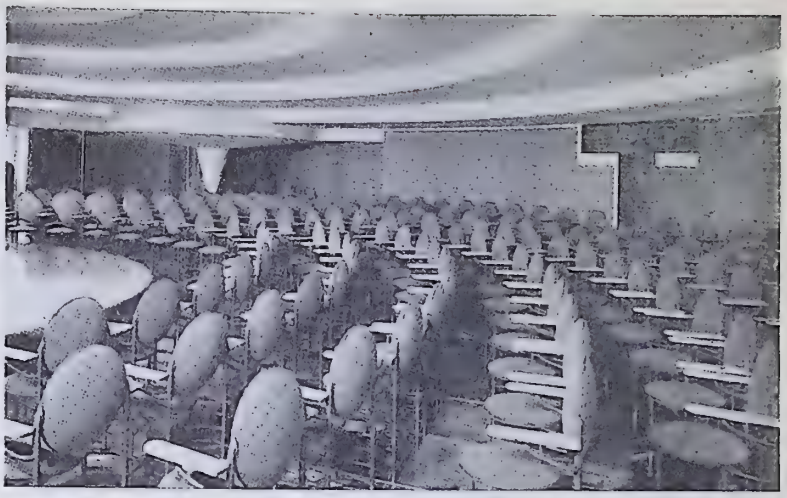
From the beginning, preview bookings in the studio ran high. Several departments make use of the location by bringing training classes in to see films. In slightly more than two months, since the studio's opening November 3, 1944, there were 73 showings for audiences numbering 745.

Groups of lecture demonstrators and their coaches have used the facilities for training, and they found the auditorium-like atmosphere (small as it is) helpful.

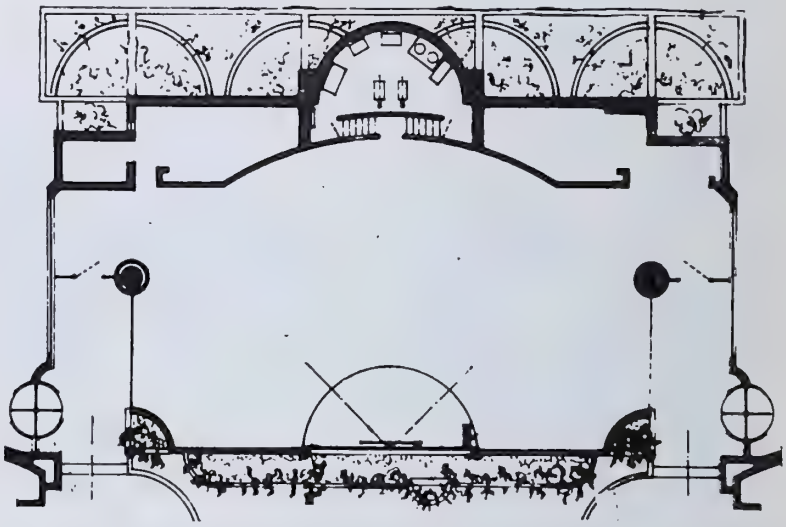
Many expressions of encouragement from all departments have been heard since the studio's opening. The improved facilities have sold themselves. The fact that film presentations can be made under conditions not unlike theatrical exhibitions should be helpful over a period of time. Already there are signs of greater film consciousness than ever before.

New locations for centralized projects have been established in several departments of the Illinois Bell. Existing conference rooms were converted for movies with the addition of a few simple provisions.

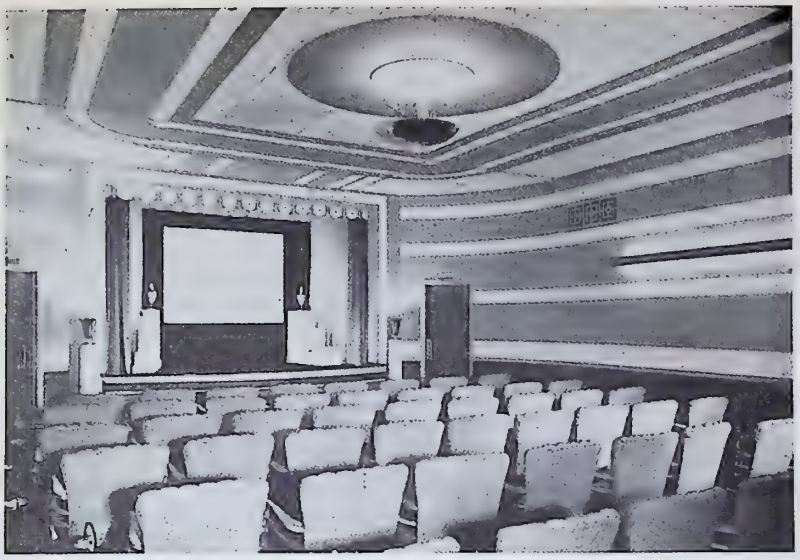
In one typical example, the change-over was accomplished easily. A roll-up screen was mounted on the wall and a loudspeaker fastened above it. Cables



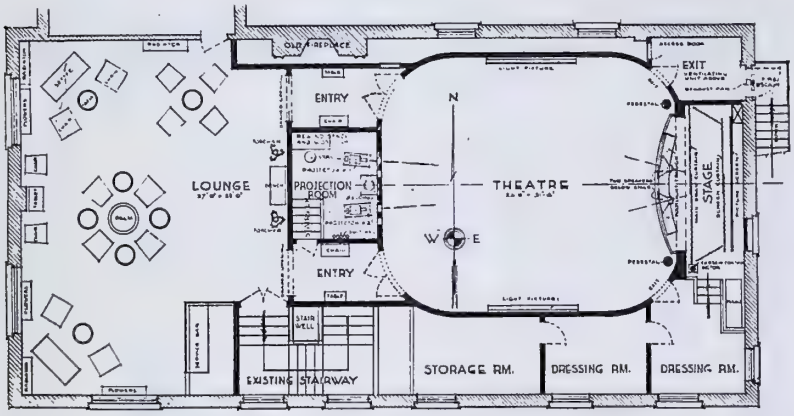
THE S. C. JOHNSON AND SON, INC., THEATRE was designed by Frank Lloyd Wright. The 250-seat theatre is used for lectures, audio-visual presentations, and recreation. Above is a view of the auditorium and below a sketch of the floor plan. The theatre was built on the mezzanine level at a cost of 92 cents a cubic foot. Because of innovations in its construction, this building of the nationally-known wax company has become world renowned.



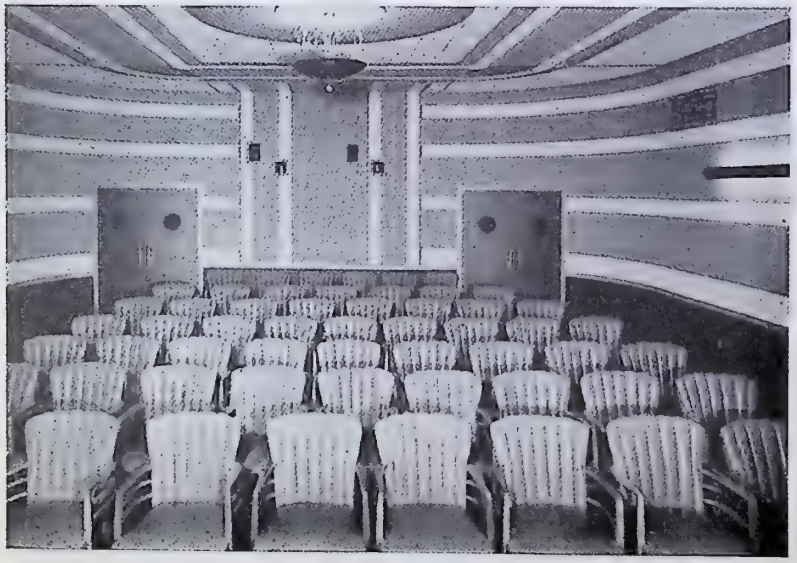
THE RADIO CORPORATION OF AMERICA'S LITTLE THEATRE is a feature of the new display and meeting rooms at the RCA Victor Division's Camden offices. The theatre, seating 48, is air-conditioned and indirectly lighted. The irregular sidewall treatment combines art with good acoustics. Standard RCA 16-mm. sound-film projector is in the booth. The raised front portion (with special overhead lighting) can be used for display of new models.



ON TOP OF THE KUNGSHOLM, a swank Chicago restaurant is this private theatre, seating 126. The room was designed for presentations of grand operas by miniature puppets and recorded music. Use of 16-mm. sound motion pictures is made possible by a pair of dual Ampro projectors in the completely equipped projection booth. RCA commercial sound equipment and latest type Jensen speakers. Top and bottom pictures show the auditorium.



FLOOR PLAN of the Kungsholm little theatre is shown in the middle picture. Lighting equipment for the 48-square-foot stage consists of 48 footlights, 48 proscenium lights, 10 flood and 12 miniature spotlights, and 500 border lights. The projection booth contains one of the finest light-control boards. Ports are provided for both projectors. The booth setup also includes first-class facilities for the storage and handling of motion-picture film.



to the speaker and power outlet were concealed as much as possible by running them along the wall woodwork and over the door frames. Black shades were installed for room darkening. The projector was placed on a small table in a corner or at the end of the room.

At another location the arrangements were carried further. Carpeting and draperies were added, and the over-all effect is better sound and more pleasing surroundings.

With this arrangement a minimum of preparation is necesary for a show. Very often a discussion leader acts as projectionist and an easily-handled set-up saves time and effort. Should the conference room be needed for other purposes, the equipment can be removed conveniently in a short time.

Locations in Traffic, Plant, and Commerce Departments have been arranged in this manner. Several others have been proposed.

Johnson Wax

An outstanding example of what can be done by intelligent planning to make a practical, pleasing business theatre is the plant and modern theatre of the S. C. Johnson and Son, Inc., in Racine, Wisconsin. Built in 1939, and designed for the famed wax company by Frank Lloyd Wright, the building has attained national notice as a completely equipped modern plant.

A theatre seating 250 people is on the mezzanine level and is used for lectures, audio-visual presentations, and recreation. Cost of the main office building, which houses the theatre, cost 92 cents a cubic foot.

Wright's description of the building—"as inspiring a place to work in as a cathedral is to worship in"—typifies the spirit of the theatre and the entire building.

Kungsholm

On the top of Kungsholm, a swank Chicago restaurant, Frederick A. Chramer has created a private theatre which might well serve as the model for America's business.

Seating 126 persons in permanent theatre-type seats, the room was designed for nightly presentations of grand operas by miniature puppets and recorded music.

Frequent use of 16-mm. sound motion pictures is made possible by a pair of dual Ampro projectors in the completely equipped booth.

RCA commercial sound equipment and the latest type of Jensen speakers bring the finest available recordings to nightly audiences.

Lighting equipment for the 48-square-foot stage consists of 48 footlights, 48 proscenium lights, 10 floor and 12 miniature spotlights, and 500 border lights.

The projection booth contains one of the finest light-control boards, in scale far superior to that of the Metropolitan in New York. Ports are provided for projectors. The booth setup also includes facilities for film storage and handling.

A floor layout and two interior views are reproduced on this very page. In the original plan, loose furniture provided less than 100 seats; with theatre-type seating equal comfort and more

than 20 percent additional seating capacity was made possible.

Minneapolis-Moline

Recently completed, a modern company theatre enables executives of the Minneapolis-Moline Power Implement Company to exhibit sales, sales- and employe-training, dealer and distributor promotional films with a quality comparable to that offered in theatres showing 35-mm. prints.

Names the Gaucho Theatre—the interior decorations carry out this motif in tune with the highly successful advertising program of the export division of the company. All pictures feature original gaucho paintings. The lower half of the side walls are of attractive knotty pine, the upper half and ceiling of Acousti-Celotex. Indirect panel lighting is used throughout. All house lighting is controlled by the projectionist through a dimmer switch box located in the projection booth. This dimmer affords complete light control, from full brilliance down to total darkness. Battleship linoleum covers the floor. The theatre is air-conditioned.

The auditorium or theatre seats from 50 to 100 persons very comfortably.

The projection booth is approximately 12 feet long by 9 feet wide.

Practically all the wiring is concealed.

Picture throw is about 40 feet, with a picture size of 7 by 9 feet.

Two DeVry 16-mm. sound-on-film projectors are used in conjunction with a DeVry Model 2820 wall-type amplifier which includes d.c. excitation for the exciter lamp, affording wow-free, hum-free sound.

The speaker unit is a DeVry model 2815 bass reflex type.

The booth utilizes standard theatre-type portholes for projection.

The booth design and layout was completed with the aid of DeVry's designing department and field service engineers.

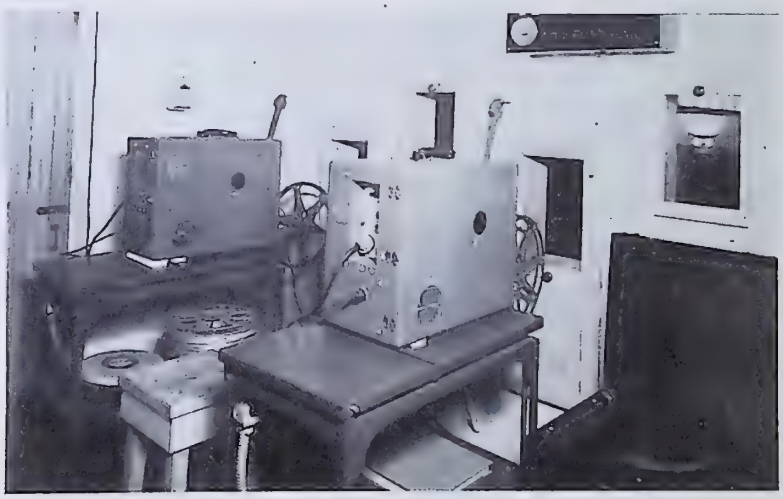
National Cash Register

The National Cash Register Company auditorium is a civic center in Dayton. Regularly used for employe-management conferences, film showing, and other company events, it is also the scene of children's parties on Saturday mornings, high school graduation ceremonies, and other public affairs. Good public relations begin at home.

The motion picture and other visual presentations are thus afforded full theatrical facilities for large group showings. Indoctrination films to acquaint new employes with company operations, policies, and job oportunities are shown; mass education in vital safety practices, and informational films as well as recreational films are widely used.

Facilities of this kind need not be huge or pretentious. An ideal seating size, based on company employment and in keeping with other buildings and the size of the grounds, will tend toward a capacity of several hundred for the larger industrial firm, employing a thousand or more persons. A well-equipped stage, projection room, facilities for amateur theatricals, and comfortable seating are physical assets along with good ventilation and well-planned acoustics.

THE MINNEAPOLIS-MOLINE POWER IMPLEMENT COMPANY built its Gaucho Theatre to exhibit sales, sales- and employe-training, dealer and distributor promotional films with a quality comparable to that offered in theatres showing 35-mm. pictures. The decorations carry out the gaucho theme, also utilized in the company's advertising. The auditorium (top and bottom) is treated with Acousti-Celotex. The projection equipment (middle) is by DeVry.



THE HOUSE LIGHTING is controlled by the projectionist through a dimmer switch located in the projection booth. This dimmer affords complete light control, from full brilliance to total darkness. Battleship linoleum covers the floor. The theater is air-conditioned. Seating capacity is between 50 and 100. Two sound-on-film projectors are used in the Gaucho Theatre, along with wall-type amplifiers, including the d.c. power for exciter lamps.

The Cooperative Plan for Local Newsreels

The Cooperation of Theatre and Newspaper Guided by Manufacturer of the Equipment

WILLIAM C. DEVRY
President, DeVry Corporation

The completion of a practical plan for the projection of a weekly 16-mm. local newsreel is the realization of an idea originating ten years ago.

Though every theatre owner, for many years, appreciated the box-office value of a local newsreel, he knew that it was too costly to produce with 35-mm. equipment and 35-mm. film. The 16-mm. projection equipment was not adequate for theatre requirements.

The DeVry Corporation welcomed the opportunity to solve this important problem; and its engineers began the development of (1) a 16-mm. newsreel camera, with professional features, to produce newsreel material at a moderate cost; (2) a theatre newsreel projector that would give the required results in lighting and screen coverage to the established motion picture theatre, (considered by many, impossible; and (3) a practical plan to assure continuous sustained success.

After intensive research and concentrated effort, the necessary 16-mm. equipment, (1 and 2), was completed. A long test period, in scattered theatres, convinced these theatre owners and the DeVry Corporation, that the mechanical problems of the Local Newsreel had been solved. The heretofore impossible had been successfully mastered. The plan of operation, (number 3), developed during this same period, completed all the elements of a "sure fire," ever-living local newsreel. Again DeVry Corporation, pioneering a new field, solved a serious problem; and is now the nation's only manufacturer to offer the equipment that makes the Local Newsreel mechanically possible in established theatres; and at the same time, enters this field with a complete service assuring continuous box-office smashes week after week. The DeVry local newsreel plan includes every feature, every detail and every element that spells profits.

Note for the near future: The local community will become an important link in a great national network; conceived by DeVry Corporation, which will produce for all those member theatres in this plan, entertainment of box-office value far beyond any exhibitors' fondest hopes and visions of the future.

A DeVry local newsreel plan now offers a theatre a weekly feature that is of greater interest than any other subject projected on the screen. It gives the patrons of a theatre the most fascinating, thrilling and exciting drama or comedy of the lives, experiences, incidents and romances of themselves, their neighbors and their friends. "A man's home is his castle," "His castle is his world" and as Shakespeare said, "The world is but a stage."

THE THEATRE'S PART IN THE NEWSREEL PLAN

The three factors in the theatre's part of the 16-mm. local newsreel plan are as follows: (1) production, (2) projection, and (3) service.

Production

Mechanical equipment—Special DeVry 16-mm. professional newsreel camera, with the necessary lenses; exposure meter; lights for interiors and heavy gauge extension cords; editing projector and screen splicing-editing accessories; stock titles.

Photographing, editing, Commentating—News production of the newspaper; which is equipped to accumulate everything of interest, in word and picture, to the community, which it serves. It manufactures news. It is, therefore, the logical newsreel producer. At the same time, however, the screen's requirements are somewhat different than printed and pictured news. This angle (let us call it), is perfected through our Service (factor number 3), described in a later paragraph. The equipment supplied the newspaper includes all that is required to produce weekly, a fascinating reel of local screen stories; all camera equipment and lights for the photographer and an editing projector with accessories, for editing the picture and constructing correctly timed comments for the commentator at the theatre.

The newspaper produces, each week, a newsreel complete in every detail, ready for the screen.

Projection

Mechanical equipment for the theatre includes a special DeVry 16-mm. rotary sprocket intermittent silent projector with exclusive DeVry Brilliante lens and optical system necessary for maximum efficient theatre booth projection requirements, complete with stand; microphone; extra projector emergency lamp; 16-mm. splicer; accessories for splicing and processing 16-mm. film; lobby banner; 35-mm. sound trailer; leader title and ending. Total value of all equipment, $812. Free service is extended on these items of equipment, at DeVry's factory, or local DeVry service stations, during the life of the contract.

Exclusive 16-mm. Sprocket Intermittent—The DeVry local newsreel projector is the only 16-mm. projector which includes the special DeVry sprocket intermittent feature. This action is an adaptation of the standard Geneva movement which has long been standard with all theatre projectors. Easier on the film, relieving undue strain—provides positive action on film—not hit-and-miss claw action. No claw movement, as in all other 16-mm. projectors, is used in the DeVry local newsreel projector.

Thirty per cent greater screen illumination—DeVry 16-mm. non-cemented exclusive Brilliante lenses are part of the local newsreel equipment. Greater illumination makes possible clear, screen-size projection. Equipped with high powered Mazda lamp—capable of projecting a good picture at distances up to 120 feet.

A real 16-mm. theatre projector—The DeVry local newsreel projector represents years of constant research, development and use. DeVry engineers, who have given modern theatres the famous DeVry deluxe 35-mm. sound projector, have incorporated in the local newsreel projector the ultimate in 16-mm. refinements—made possible by our 25 years' service to the profession.

The projector stand is all steel, and of light weight, and adjustable, so that it is easily set at proper angle for theatre projection. Measures when folded, 20½x10½x2½ inches.

The weight and portability of the complete equipment permit its use in the most compact theatre booth.

The microphone, for the use of the Commentator. (Further explained, in detail, under "Service.")

The lobby banner is an attractive display, made of heavy silk, for use in the lobby on local newsreel play dates.

The 35-mm. sound trailer, with snap and flash, announces the coming of the local newsreel as a regular feature.

The leader title is made up in accordance with the specifications of the theatre and newspaper, for example:

THE ROXY THEATRE
PRESENTS
THE
DAILY GAZETTE
WEEKLY NEWSREEL
or
THE ROXY THEATRE
PRESENTS
THE
DAILY GAZETTE
WEEKLY NEWS DIGEST

or any others as desired. The ending is an attractive fade-in that adds that touch of professional completeness. Both these last two can be saved and spliced in each week. New prints are supplied at a nominal cost.

Service

This, the third important factor, is the assurance policy of the DeVry local newsreel plan. It utilizes all the built-in qualities of the superior equipment supplied, to produce and project box-office record-breakers in one continuous weekly stream throughout the years of our association. It assures steady profits, nothing is left to chance.

Every detail in each community is checked and supervised by a DeVry

supervisor, who makes weekly or periodical calls. His responsibilities include:

Coaching the cameraman as to the type of subjects for newsreel use—stores—movie photography.

Lay out stories for activities of organizations and institutions.

Choosing and coaching the comment writer and commentator.

Compiling and submitting definite continuities and sequences for photographing each week.

Checking continuous publicity and exploitation by newspaper.

When necessary: Photograph special events and originate publicity.

Organize and conduct Local Newsreel Clubs.

Keep close personal touch with each theatre and newspaper in his district.

From the DeVry Local Newsreel headquarters there is obtainable:

A service with each newsreel which includes:

Inspection for photography, composition and continuity.

Editing—to return a reel that is up to theatre standard.

Instructions—on further editing for local interest purposes; on type of commentating to use (details to be added at newspaper).

Weekly bulletins.

What other members of plan are doing.

New developments.

New promotions and ideas in operation.

It is our aim to keep in close touch with each theatre every week. Assuring success in each individual community, assures the success of the entire Plan nationally.

How the Plan Works

The newspaper produces the stories and takes the pictures. The exposed negative is mailed to a DeVry laboratory. It is developed, printed, processed and serviced as above, and immediately returned. The newspaper then completes the editing, comment writing, timing and delivers a complete weekly newsreel issue to the theatre. The theatre operator splices in leader and end, and the film is ready for projection. A simple process, in which all the detail and necessary steps have been predetermined by the DeVry Corporation, leaving nothing to chance, nor requiring hours of labor which would otherwise be necessary.

The following are a few sources of news, for the local newsreel, to every newspaper in every town:

Amateur theatricals

Rehearsals and the like

Making a movie short

Activities of Schools, Churches, Clubs, Y. M. C. A., Girl Scouts, Boy Scouts, Fraternal Organizations, Civic organizations, Chamber of Commerce, Women's Clubs, Business Men's Luncheon Clubs, Police Department, and Fire Department.

Picnics, Inventions, Parties, Funny Face Contests, Pie Eating Contests, Baseball, Football, Basketball, Swimming, Birthday Celebrations, Silver Weddings, Golden Weddings, Holiday Birthdays, Local Scenery, Railroad Stations, Industrial Concerns, Political Leaders, Hospitals.

Weddings.

Departures, Arrivals, Artists, Designers, Playgrounds, Fashion Shows, Pet Shows, Baby Shows, Skating Rinks, Hockey.

Beauty Contests.

Each one of these institutions alone contains enough material to construct short, interesting scenarios, to use as a part of 40 or more of the weekly newsreel issues of the year.

For example in a school:

Dramatic society activities

Girls' Domestic Science

Athletics—practice of the various teams—games

Holiday exercises.

Each one suggests a complete scenario, such as Domestic Science: Mary Jones, surrounded and assisted by members of the class, baking a birthday cake for her mother—a flash of her home—a flash of the party.

A complete list of scenarios in detail, for the entire 52 weeks, is submitted to members of our plan. No worry of what material to use each week.

In our service we give you complete weekly instructions for producing interesting issues. In all publicity stunts and scenes for the local newsreel, one point must be kept in mind, whereas in the newspaper the picture is drawn by word in combination with a still picture, on the screen the fascination is in the action and construction of a story with a good continuity. As in your daily paper, human interest stories or continuities are most valuable.

Another important point to remember is that the available sources of interesting news are unlimited. A town of less than 3,000 population has found it a simple matter to produce an interesting weekly newsreel for nearly two years. Yet, the well has shown no signs of running dry. As long as a town is on the map and its inhabitants alive, its children growing older and new children coming into the world, there are new things happening every day. The fountain of news is inexhaustible.

All local Newsreel issues should be so constructed that the most close-ups possible (which are of greatest interest to the reader of a paper or the patron in a theatre) are contained in the reel. In this manner the best in pictures is accomplished. Mass pictures are usually uninteresting. We strive always for interesting professional results.

In the production of the local weekly newsreels, one thought is kept in mind—"box-office value." Therefore:

Every action is designed to "mirror" the audiences, that is—show the audience themselves in close-ups wherever possible. With an average of seven scenes to a 100-foot reel, and an average of seven people to a scene, forty-nine people buy admissions to see themselves; and five times that many (as statistics show) or 245 friends and relatives, buy admissions to see the other forty-nine. At 30 cents an admission average, this equals $73.50. Now add the hundreds who are interested in all that happens in the community, and the thousands in the larger towns; then you can understand why Local News Reels top all box-office records. One local newsreel showed $300.00 above normal business in a single night, over $600.00 in two nights.

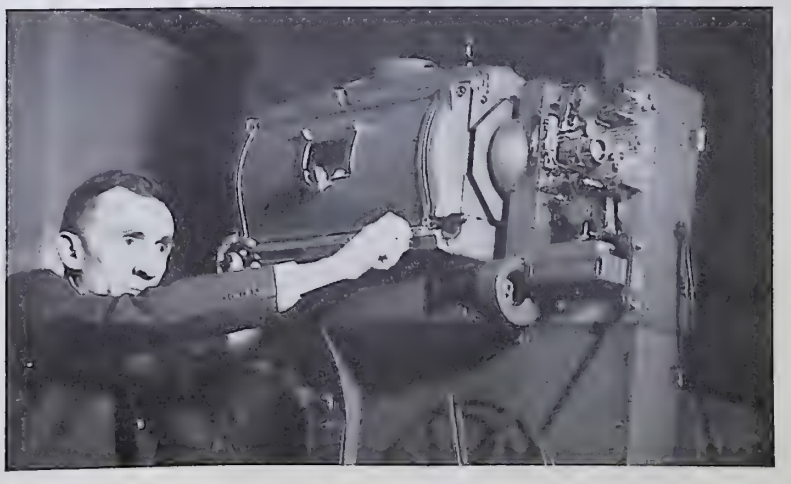
Equipment, service and high "box office" at low cost.

THE NEWSPAPER'S PART IN THE PLAN

The primary function of a successful newspaper is the assembling of the local news of human interest, and presenting it to its readers in an attractive form. The prestige and good will of the newspaper is dependent upon the efficiency of its newsgathering and presentation or editing organization. The aim of every local publication is to be the authority and fountainhead for all the news that is distributed. Radio and motion pictures (the weekly newsreel) have become an important factor in the "complete news" chain.

Before radio and motion pictures, there was only one factor to recognize and that

THE DeVRY 16-MM. ARC LAMP THEATRE PROJECTOR is the first professional equipment to be designed especially for use in theatres, either for the projection of home-made newsreels or for complete shows of entertainment films. Magazines hold 4,000 feet of 16-mm. film, affording 1¾ hours of continuous playing time. The light source can provide a 24-foot image at throw of 125 feet. Equipment has heavy-duty sprocket intermittent movement.



was the newspaper. Then came motion pictures with the projection or distribution of news on the screen; and later the radio with distribution of news over the air. Metropolitan dailies, seeing probably loss of control, combined with national newsreels, so that news on the screen would be identified and be part of the newspaper. When radio made its appearance, newspapers fearing a loss of interest in its written word, immediately took steps to control news over the air and arranged to be identified with the news that was broadcast. These advantages for news control were possible only to the metropolitan daily.

For years the DeVry Corporation realized that if the proper equipment were designed and a proper plan drawn, it could give to the smaller newspaper the same advantages of news control on the screen that were available only to those publications in the large cities. About a year ago, the development of the mechanical requirements was completed. A practical plan was developed. Then followed a year of experimental installations in various localities. Public acceptance was far beyond all anticipation. Details were refined and polished. As a result, the DeVry Local Newsreel Plan is now presented to newspaper publishers throughout the nation.

The plan is now being successfully operated and giving to the newspaper all that has long been desired. It gives news control in the particular area to which the newspaper circulation is confined. It gives the newspaper the good will of its readers. It enhances the prestige of a publication locally and nationally.

The necessary equipment is placed at the disposal of the newspaper and makes available promotions and advertising specials that heretofore were impossible without a great deal of expense.

Equipment Loaned

Under the provisions of the plan, with which the local paper now supplements the news in print, with portrayal on the screen of the action in daily community happenings and active life drama of the inhabitants, the following equipment is loaned:

A special DeVry 16-mm. newsreel camera, in case, with necessary lenses.

A newsreel editing projector, with case.

An exposure meter.

A set of photoflood lights, reflectors, stands, extension cords for interiors.

Accessories for editing and completing film.

Titles.

Title leader and ending.

Plan's Construction

There are three factors which combined to make this plan successful: First, the production of the local newsreel; second, the projection; and, third, service. In this outline numbers one and three will be gone into thoroughly. Number two affects only the theatre and needs but little space here. In short, the projection in the theatre is dependent upon the equipment which was developed by this company over a period of years. It is due to intensive research and equipment development that satisfactory lighting and full lighting and full coverage of the theatre screen is so perfected, as to make the local newsreel possible. We pride ourselves on this achievement. It is ours exclusively.

Production

With the equipment as listed above, it is possible to take pictures of interesting events and incidents in the daily life of any particular community. These events are woven into story form so that they become interesting features to theatre patrons. What is more interesting than seeing yourself, your neighbors, and your friends in action. This human weakness applied to all of us and gives us a warm feeling toward that person or organization which makes it possible of fulfillment—good will.

The newspaper photographer or cameraman soon finds that the operation of a newsreel camera is not a mystery, but as simple as handling the still camera he is now using. With little instruction, he soon becomes efficient. It requires no extra time, as he can carry both equipments when he goes out on his assignments. The cameraman is usually more than interested in taking motion pictures. It gives him a new field and makes his work more fascinating and enjoyable.

The comment writer is another factor of production. His duty is to write comments that go to the commentator at the theatre and are read over the microphone as the picture is shown. This is again a simple procedure. Under the DeVry service, one of the members of the editorial department, possibly the cameraman himself, is given competent and thorough instruction on writing interesting, crisp comments and timing them to the newsreel with the use of the editing projector.

Service

Service is the key to our local newspaper plan, that assures complete success. The equipment is the working tool. The local organization would soon fail if it were not given the proper service and supervision. When arrangements are made for the local newsreel in any locality, a supervisor is immediately assigned to assist, first, in the organization and, second, in the production of the weekly local newsreel. His responsibilities include:

Coaching the cameraman as to the type of subjects for newsreel use, stories, and movie photography.

Layout stories for activities of organizations and institutions.

Choosing and coaching the comment writer and commentator.

Compiling and submitting definite continuities and sequences for photographing each week.

Checking continuous publicity and exploitation by the newspaper.

When necessary: Photograph special and originate publicity.

Organize and conduct local newsreel clubs.

Keep close personal touch with each theatre and newspaper in his district.

From the DeVry local newsreel headquarters the following items of service and help are obtained:

A service with each newsreel which includes inspection for photography, composition, and continuity.

Editing: to return a reel that is up to theatre standard.

Instructions: on further editing for local interest purposes on type of commentating to use (details to be added at the newspaper).

Weekly bulletin giving new and novel scenarios or continuities to be used; new promotional ideas in operation; and effective additions to newsreels.

Mat for the local newsreel columns.

It is our aim to keep in close touch with each theatre every week. Assuring success in each individual community, assures the success of the entire plan nationally. A complete list of scenarios in detail, for the entire 52 weeks, is submitted to members of our plan. No worry about material to use each week.

Producing the Issue

Using the above factors, the procedure followed for producing and delivering to the theatre one week's issue of the local newsreel is as follows:

When the cameraman has taken his pictures (suggest using 100 feet each week), he sends his exposed negative roll of film to the DeVry central office in his territory. DeVry or its agent in the territory will develop and print that film, follow the procedure as stated above in regard to editing, composition, and comments, and forward to the newspaper. The commentator will time his comments with the film (the editing machine runs at the same speed as the projector at the theatre). When this is completed, the film plus the written comments are given to the theatre where the heading or name of the local newsreel and the end title will be added before showing on the screen. One 100-foot roll of 16-mm. film is equivalent in running time to 250 feet of standard 35-mm. film, or approximately 3 to 4 minutes.

The districts are being so arranged as to give the maximum speed to developing and printing service, and in many cases is much faster than the present national newsreels receive.

Plan's Publicity

First, a suitable name should be found for the newsreel. In some cases a simple heading is used, such as "The Orpheum Theatre Presents the Daily Journal Newsreel."

Second, the newspaper to gain full benefits from the newsreel, should keep its readers in daily touch with newsreel pictures that have been taken. The public knowing that events are being made into motion pictures will be looking in the newspapers for information of when and where they may see the newsreel. It is suggested that the newspaper have a regular cut for its newsreel column, such as "Events in the Local Newsreel" or "News Pictures in Action," with a by-line of either the cameraman or the comment writer.

It is well to mention here that the newspaper itself or in conjunction with the cameraman or comment writer have an incentive to cover unusual or strange incidents of national interest. Such things are happening continually in every community. It is planned to issue weekly prizes for these film news strips.

Material for Further Use

A contest for a name for the local newsreel—such as Daily Times Local Newsreel, Daily Times Local News Digest, Daily Times Town Topics, and the like—first prize being, as a rule, a season theatre pass.

As part of the first issue—pictures of the mayor and other local officials giving endorsement to the inauguration of the local newsreel.

Another issue should contain, as an item, pictures of the police and fire chiefs giving their endorsements by virtue of safety in traffic and safety from fire hazards. These stories to be built up with action pictures of the equipment used by the two departments.

Other issues would contain, in part, life in schools and other city and county institutions.

Each one of these institutions individually contains enough material to construct short, interesting scenarios to use as a part of 40 or more of the weekly newsreel issues of the year.

For example, in a school: Dramatic society activities; girls' domestic science; athletics—practice of various teams—and games; holiday exercises.

Each one suggests a complete scenario, such as domestic science: Mary Jones, surrounded and assisted by members of the class, baking a birthday cake for her mother, a flash of her home, a flash of the party.

This service gives complete weekly instructions for producing interesting issues. In all publicity stunts and scenes for the local newsreel, one point must be kept in mind, whereas in the newspaper the picture is drawn by word in combination with a still picture, on the screen the fascination is in the action and construction of a story with a good continuity. As in the daily paper, human interest stories or continuities are most valuable.

An important point to remember is that the available sources of interesting news are unlimited. A town of less than 3,000 population has found it a simple matter to produce an interesting weekly newsreel for nearly two years. Yet the well has shown no signs of running dry. As long as a town is on the map and its inhabitants alive, its children growing older and new children coming into the world, there are new things happening every day. The fountain of news is inexhaustible. The following are a few sources of news available to every newspaper in every town:

Amateur Theatricals—the dramatic society, rehearsals and the like, making a movie short.

Activities of schools; churches; clubs; Y. M. C. A.; girl scouts; boy scouts; fraternal organizations; civic organizations; chamber of commerce; women's clubs; business men's luncheon clubs; police department; fire department.

Picnics.
Inventions.
Parties.
Funny Face contests.
Pie-eating contests.
Baseball.
Football.
Basketball.
Birthday celebrations.
Local scenery.
Railroad stations.
Industrial concerns.
Political leaders.
Hospitals.
Weddings.
Departures.
Arrivals.
Artists.
Designers.
Playgrounds.
Fashion shows.
Pet shows.
Baby shows.
Skating rinks.
Hockey.
Beauty contests.
Swimming.

All local newsreel issues are constructed so that the most close-ups possible (which are of vital interest to the reader of a paper or the patron in a theatre) are contained in the reel. In this manner the best in pictures is also accomplished. Mass pictures are usually uninteresting. Strive always for interesting professional results.

A local newsreel club, sponsored by the newspaper—members to be owners of 16-mm. cameras. This is an important promotion of the newspaper. It will prove astonishing how many people in a community own such equipment.

Not only can a tremendous amount of good will come from the establishment of such an organization, but the interest will often be manifested by valuable pictures taken, and assistance in emergencies, such as floods, catastrophies, and so forth, big football games, and other events. Contests may be held for members who have taken the best pictures and so on into unthought of ideas.

In conclusion this entire plan has been designed to become part of the daily or weekly news of a locality. It is as much part of the newspaper as the editorial department or photographic department. It represents progress in news gathering and presentation. A newspaper in availing itself of this 20th Century opportunity is on a high plane with those who are striving to give their readers all the news in the most modern manner. News control for prestige and good will.

The slight expense to the newspaper is of minor consideration.

SUMMARY

The DeVry local newsreel is more than the answer to the exhibitors' prayer. It is a strongly welded permanent associaion of the local newspaper and theatre in a progressive, modern venture. It is a venture of mutual benefit to both—to the newspaper—in its building good will and prestige in the community through news presentation in every form available, and to the theatre, through immediate cash benefits from increased business.

Every feature picture made, no matter how great, always did and always will seek local tie-ups to get the utmost business. Every item that has local interest draws the most business. The local newsreel concentrates this drawing power into a weekly box-office hit.

Now the theatre can have an exclusive local interest feature—a complete story of the community, drama, comedy and action, each week. In other words, the local newsreel ("heart of the show") is a regular, steady weekly money-making attraction.

Furthermore, the newspaper, with its available sources of news, manufacturing of news, professional photographer, and with our service is able to produce a fascinating live professional newsreel.

Local newsreel features have reported as high as $600 above average receipts, in a two-day showing. This means that more than an entire year's rental of the equipment is actually paid for in one issue; and remember, the DeVry local newsreel is issued 52 times a year.

News is always of importance to every human being, as evidenced by the tremendous combined circulation of the newspapers of the nation. Further proven by long continued interest in the national newsreels on the screen.

Local news—news of our neighbors and ourselves, is of the greatest interest; and recognized as such by motion picture producers. It is the reason that they attempt and suggest local tie-ups with every feature produced. Combining these facts, we have in the DeVry local newsreel, not only news but a feature; a weekly news feature of the most vital interest to every person in the community.

Artificial stimulant is only temporary, and often harmful. Bank night, double features, lotteries, etc., are artificial stimulants.

The normal natural method of increasing business is by giving greater values; in the theatre it is greater entertainment; thereby developing a healthy lasting success. That is why successful exhibitors welcome the local newsreel—it is fundamentally good business.

To the progressive wide-awake theatre owner the DeVry local newsreel plan presents possibilities far beyond those outlined above. The equipment available to him in combination with the newspaper, and his close association with the newspaper, opens new avenues of promotion that means extra profits to both.

Heretofore, the theatre requested publicity of the newspaper. Under this plan, the newspaper willingly supplies (due to a self-interest) publicity in a steady stream.

It all adds up to "box office." We can only present the opportunity—the decision is yours, but "step on it" before your competitor acts.

In addition to the benefits of the DeVry local newsreel plan, every member will participate in the profits of the comprehensive DeVry 16-mm. theatre plan a development of unlimited scope in the entertainment field.

In the near future, added features, exclusive to these members only, of a nature entirely new to the public will be presented. The DeVry new modern theatre features reaching far beyond all dreams, is acclaimed by the greatest executives in the motion picture industry.

The 16-mm. DeVry local newsreel plan has been named by Film Daily as one of the motion-picture industry's outstanding achievements of the year. It is the topic of conversation of the entire industry. Its inevitability, as an important factor in the progressive motion picture theatre is admitted. Your opportunity is now. Do not "wish I had" later.

Experiences with Home-Made Newsreels

Complete Coverage of Local Happenings Creates Good Will and Better Patronage

The development of a local newsreel can be effected for the betterment of the small theatre; and to indicate how it is done, there is presented here the personal account of Jerry L. Drake, creator of the Ritz News for the theatre of the same name in Bolivar, Missouri, and of J. R. Boice, creator of the Strand News for that theatre in Warsaw, Indiana.

The following reports tell of real-life experiences in a field that, once entered, is not difficult for the enterprising theatre man to develop as a tremendous force for good will and better box-office for himself and his community.

First, the story of Jerry Drake and the Ritz News.

THE RITZ NEWS

The idea of a local newsreel was fostered as far back as 20 years ago. An experience with a local fire in Warrensburg, Missouri, which was photographed, caused such interest that it drew above-average business. This event was photographed by a former Universal cameraman and my position as projectionist at the local theatre gave me an opportunity to assist in the making. From that day on, I determined to make a local newsreel.

Making a local newsreel in 35-mm. was out of the question for smaller theatres and had to be shelved until a more reasonable medium was developed. So in 1940 we purchased a Bell and Howell 70-DA 16-mm. camera fitted with Taylor-Hobson 1/3 inch and 15-mm. lens, which enabled us to shoot under any light condition. We use a Bell and Howell metal tripod for lighter work but for the heavier work we use the Professional Jr. tripod which is a splendid piece of equipment.

Son Jerry Shepherd Drake became interested in the project and this fitted into my scheme perfectly. His knowledge of local school and social events helped to keep me posted.

Since then we have gradually built up our equipment, and now have complete title equipment for making all kinds of titles, Bell and Howell action viewer, and editing equipment. A camera dolly was built from Ford front axles and hubs. Our lighting equipment consists of 5,000-watt spot, 1,500-watt spot, and several flood units. Just recently we received a new model Y2 Presto recorder with Synchro-Sound units which will enable us to synchronize our film with sound. However, any good 16-mm. camera with good lens will enable any exhibitor to make good pictures for a local newsreel.

We project from our projection room and use a Bell and Howell 1,200-watt 16-mm. projector. As our projection distance is 85 feet, the results are not as good as would be if an arc were used. This will be replaced by an arc projector just as soon as possible.

Right here I would like to impress upon any exhibitor the importance of getting good light on your screen. For 60 feet or under, you can get by with a Mazda but for longer projection distances an arc is the only thing that will do. We purposely underexpose all our film due to the fact that we are at present using Mazda for showing our 16-mm. news and this helps a lot.

Our local newsreel is a silent one, and with good titles and musical background from a record player, plus a mike, you can put on a pretty swell newsreel.

On the nights we show our newsreel our gross jumps about $50 over our regular night, and we usually gross better than $100 for the two nights. If we run a matinee both days it goes even better. Of course, we pick a Thursday-Friday, and the more local news interest, the more the box office responds. A local newsreel serves the same purpose as the local newspaper. Names of people and local events. Our news subjects are also local: places you know, people you know, events you attend.

We attend the picnics of the surrounding communities, the opening of the swimming pool, the beginning of school, the drum and bugle corps parade, school activities, cattle shows, and farm sales. All of these are of local interest, and we close with a color sequence as the rest of the news is made in black and white. We try to pick out some beauty spot or sport occasion for our color sequence, and this really adds to the effectiveness of the newsreel. Attending these functions is the best way in the world to get acquainted with your patrons and the results are reflected at the box office.

We make and show a local newsreel

THE RITZ NEWS goes after the news, for interesting street scenes on one of the big trade days in Bolivar, Missouri. At the camera, Jerry Shepherd Drake, son of the Ritz's Jerry L. Drake, sets his sights on the scene, while George A. Green studies the light conditions. Since no retakes are possible, it must be right the first time.

NEWS COMES TO THE NEWS, such as when a returning serviceman is interviewed for the next edition. Jerry L. Drake is at the camera, while son Jerry manipulates the spotlight. These examples of what can be included in a local newsreel are but two of the many incidents of civic interest that can be caught by the entrepreneur.

once a month, as this is about as often as smaller places can get material enough for a newsreel of 400 feet, which is equal to 1,000 feet in 35-mm. At silent speed, or 16 frames, it runs even longer, as the above comparison was made on 24 frames a second, or sound speed.

We have a special 35-mm. sound trailer which we use to advertise the date of local news. Also window cards, heralds and even bill boards are used. We use a card which is distributed in the crowd as the cameraman is shooting and this has the date and place of next newsreel showing. In fact we give our local newsreel top billing in every way we possibly can.

Not unlike the preceding narrative, here is the story of the experiences of J. R. Boice and the Strand News.

THE STRAND NEWS

Looking for something with some box-office pull because of the acute shortage of good short subjects, I started the Strand News on October 10, 1938. Camera was an Eastman Model K. But I now have a completely equipped Eastman Cine Special, with our own processing outfit, which enables me to get "hot" news on the screen in 75 minutes after it happens.

In the booth I used to have an Eastman Model K Kodascope, 750 watts, projecting a 14-foot picture at a throw of 110 feet. But this was rather inadequate for the purpose, so, after about five weeks, I changed to a DeVry 1,200-watt projector. And after a year or so, this equipment was replaced by a Holmes arc-light projector.

The increase in gross the very first two days paid for the original investment, and made many new customers, some of whom have been coming for years, because once they saw themselves in the movies on a theatre screen!

Usually I have one new news each week, which runs all week, although the theatre itself operates on a policy of three changes of program.

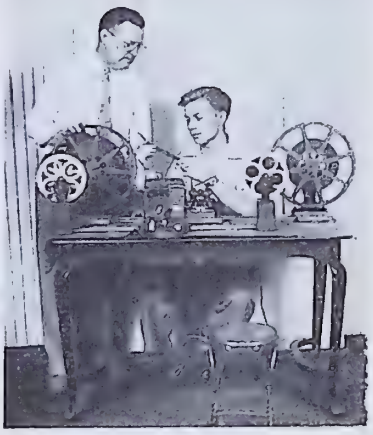
Part of the key to success is my policy of always advertising the local newsreel in the newspaper, as well as mailing a card to the persons appearing in the Strand News.

From these strikingly parallel experiences in the making and showing of home-made newsreels, the theatre operator may well ponder the possibility of similar successes in his own theatre.

As more and more equipment comes on the market, and models better adapted to theatre service than the present equipment more or less designed for non-professional use become available, together with improved and practically fool-proof film, home-made newsreels should prove advantageous in many places.

There can be no question that the best study of mankind is man—and when that "man" is a theatre patron, the best study, for screen and box-office purposes, is "Me"! The theatre operator, being forewarned, let him now be forearmed!

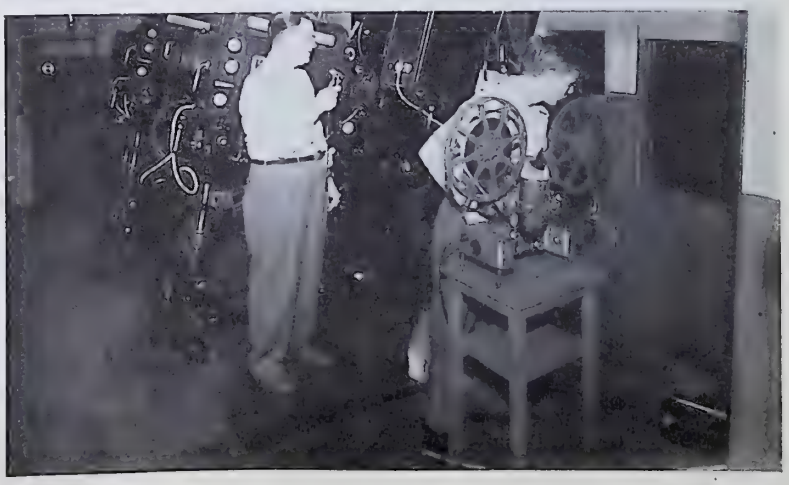
WHEN THE EXPOSED FILM IS PROCESSED, the time comes for adding the commentary. Here Jerry Drake is at the microphone, while Son Jerry operates the Bell and Howell projector and son-in-law George Green supervises the transcription cutting on the Presto Model X2 recorder. It is at this point where the exact amount of commentary that is needed is professionally polished off. Sound effects and music can be added, if desired, to the recording.



EDITING THE RITZ NEWS is done by both the Drakes, father and son, to insure a local newsreel that is as professionally put together as it is possible under the condition that the work in Bolivar has to be done.

PEPARING THE TITLES is done by George Green, who after his discharge from service resumed his studies at a Tulsa art school. The titles are photographed and inserted in the newsreel at the appropriate places.

PROJECTING THE NEWS from the booth of the Ritz Theatre. In this case a Presto Model X2 public address system is used, with the original recording playing in synchronization with the films, or with special commentary added at the time of screening by Jerry Drake, using a microphone in the booth. Son Jerry again operates the 16-mm. projector. The 35-mm. equipment further attests the progressive spirit of the management of the Ritz Theatre.



Prolonging Service Life of 16-mm. Prints

Suggestions on Ensuring Long, Useful Life For Films Needed for Profitable Operation

FRANK WING, JR.
Research Department, Ansco Division, General Aniline and Film Corporation

The useful life of a 16-mm. print is of interest to every film distributor, for it is inseparably associated with profitable operation.

The circumstances that determine film condition or lead to damage may involve handling, storage, and projection.

A print in service is no better than the worst treatment it has received. There is no single beneficial act, such as adjustment of equipment, humidification, cleaning, or surface treatment before handling, that alone will cure all film ills. Longer print life can be achieved only through proper treatment of film by all who handle it.

Factors influencing service life of 16-mm. prints fall into three general subdivisions:

(1) Influence of laboratory processing.

(2) Conditions in projection and attendant film handling.

(3) Factors encountered in or controllable by film libraries.

In general, the first of these factors cannot be controlled by the film distributor or exhibitor. Fortunately, most laboratories now produce prints of excellent quality, therefore, laboratory troubles are rare compared to those from other causes. Improper processing is generally avoidable by dealing with reputable laboratories having high standards of quality and precise control of processing.

GREEN FILM

Following initial drying of film in a motion picture laboratory (after treatment in a hardening-fixing bath) the gelatin structure of an emulsion contracts and is permanently changed. The hardening action still continues for a time as a further small amount of residual moisture is given up. While traces of excess moisture remain, the emulsion is "green," relatively soft, and susceptible to the slightest scratch or abrasion. In projecting freshly developed "green" film, minute emulsion particles are scraped off, accumulate in the projector, and become hardened with heat and friction. If not removed, they cause excessive tension from friction or abrasion of film passing through the gate, with consequent scratches, pulled perforations, and projector chatter. With time, green emulsion gives up residual moisture, and picks up traces of oil from the projector, becoming harder, surface lubricated, and less susceptible to abrasion and tendency to form deposits in the projector.

When properly aged, film will be nearly as scratch-resistant during the first projections as it will be after some time in service. Experience shows that storage of new prints, without projecting for a week or more, is perhaps one of the most important acts by which film distributors can minimize damage to new films.

PROJECTION

Projection is the most important of factors influencing service life of 16-mm. prints.

In the beginning, 16-mm. films were intended for amateur cinematography, and although they are now important as a medium for advertising, education, and entertainment, certain practices persist from the time when 16-mm. only meant "home movies." To further the use of 16-mm. pictures without trained projectionists, a gospel of "anyone can run a projector" was propagated. This slogan is largely true, but any person who is to run a 16-mm. projector should be properly instructed, and should understand a few simple points if poor projection and film damage are to be avoided.

FILM DAMAGE DURING PROJECTION

Film damage during projection may result either from improperly maintained equipment and incorrect operation, or from the condition of a print when it is received from the distributor.

Concerning projection, the entire matter is concisely summed up by J. A. Maurer in the following views:

(1) No projector of reputable manufacture will injure film if it is threaded correctly and if the projector is kept in proper operating condition.

(2) Film can and will be damaged by any projector if it is not threaded correctly, or if the mechanism is not kept clean.

(3) Proper threading of film in a projector is not a matter of special difficulty, but damage can only be avoided by assigning responsibility for the care, cleaning, and lubrication of each projector to some reliable person, and by allowing only persons who have been properly instructed in the threading and control of the projector to operate it.

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PROJECTOR MAINTENANCE

In a properly designed projector, assuming the gate and all other film-guiding parts are polished and perfectly clean, film in good condition should run without any trouble or damage to the emulsion surface. This implies nothing more than plain cleanliness and avoidance of dirt in the projector. If dirt is allowed to accumulate, in addition to scratches which occur while film passes through the gate, prints are frequently scratched if one or more rollers are stuck and do not turn freely. The cause of this trouble is obvious, and it should never occur if equipment is properly maintained.

Both tension adjustment and construction of projector gates are important. If all film supporting or guiding surfaces in every projector were perfectly smooth and constructed of a suitable glass-hardened material, there would be little trouble. But, unfortunately, some projectors have rather flimsy gates that are not sufficiently smooth and hard, though the better machines are constructed to give excellent service.

Obviously, excessive tension will retard free passage of film through the gate so that pull-down claws advance the film with excessive stress upon the perforations. This leads to nicked or pulled perforations, a starting point for further rapid wear and progressive deterioration of a print, leading to unsteady projection during subsequent showings.

SCRATCHES IN PROJECTOR GATE

Much film has been ruined by passing through projector gates that appear all right upon casual observation, but have minute scratches or abrasions of the metal, resulting from dirt and wear, or caused by ignorant persons who clean film supporting surfaces with a pin or other sharp metallic instrument. Minute scratches or abrasions of the gate that are hardly discernible may lead to chronic projection troubles because particles of emulsion are scraped from the film and deposited on the metal along with dust and dirt, forming deposits that further scrape and scratch any film that is run through the projector. Worn or abraded film-guiding surfaces should be replaced, and any part of the projector which comes in contact with film should be cleaned very carefully, using only non-scratching instruments of bone or wood. Metal should never be used.

THREADING

Bad threading and loops that are too large or small are common sources of projection trouble. If loops are too

large, the moving film may touch projector parts not intended to guide the film, with consequent scratches and abrasions. Short loops may cause any amount of damage to perforations, varying from slight pulling or nicks to outright tearing and irreparable destruction, so the ruined sections of the print must be discarded.

A projector sprocket turns at constant speed to drive film into the upper loop, but pull-down claws advance at greater speed as they intermittently move it through the gate. If the upper loop is too short, it will not contain a sufficient length of film to allow unimpeded intermittent film travel through the gate, and then perforations may be pulled or torn. Slack in the loop is taken up and film is pulled taut between the sprocket and the pull-down claws because it is not fed into the loop as fast as claws move in their downward stroke, and since film does not stretch like rubber, it must tear or break.

SPLICES

Difficulties that may arise from poorly made splices are so well known that they should require little mention. When a bad splice passes through the projector, there is always danger that it will part or that film will break, especially when going over sprockets or through the gate.

A splice should not be thin from too much scraping to remove emulsion, but thick splices also may give trouble, and it is often helpful to scrape the base lightly, in addition to removing the emulsion, to reduce thickness of the splice and give better adhesion. Film cement should be fresh and applied neatly, sufficient for good adhesion but without excess that makes film buckle at the splice. The finished splice should be smooth and clean, for sharp edges at the ends where films are joined, or dirt lodged at the splices before cement is dry, may cause abrasions or scratches, particularly when film is run in a continuous projector.

PROJECTOR CHATTER

When film is green or contains excessive moisture, fragments of emulsion may be scraped off and accumulate in the gate. In such cases a projector sometimes runs quietly for a short time and then becomes more noisy with increasing chatter which may suddenly stop and then gradually return after a few moments of quiet operation. Such an occurrence indicates that dirt or emulsion or both are accumulating in the gate and rubbing against the films with increasing pressure until the film binds against the foreign deposit and dislodges it. A period of relatively quiet operation then follows until another deposit of emulsion or dirt begins to accumulate.

WARPED AND BUCKLED FILM

A film that is warped or buckled may give trouble as it runs through a projector because the film does not lie flat and will not remain in focus. The uneven or warped film is subjected to friction and binding as it passes through the gate of the projector, and because the film does not remain in focus, it may be necessary to increase tension at the gate to hold the film flat. This adds insult to injury, and a vicious circle comes into being as the further increase in tension leads to further excessive wear and abrasion.

Another source of difficulty is the rewinding of film after projection. If rewound too rapidly, it cannot cool properly and take up moisture from the atmosphere to replace that lost from heating during projection. Film may dry out very little during any one run, but wound in a roll, it can take up moisture only at the edges. Therefore, repeated projection with certain machines, followed by rapid rewinding, constitutes a process of slow drying and so the films may finally become quite dry and brittle, possibly accompanied by buckling or waviness when edges of film in a roll take up moisture between projections or during storage.

BRITTLENESS AND CURL

A film that is too dry from improper storage or repeated projection, without treatment to restore the required moisture between projections, will be brittle and very susceptible to breaking or damage to the perforations. Over-dried film also shows excessive curl, for, as the emulsion coating gives up moisture, it shrinks more rapidly than the base material, thus causing the edges of the film to curl towards the emulsion side. Curled film may require increased tension in the gate to hold it in focus during projection, thus leading to troubles similar to those from warped or buckled film.

UNEVEN WINDING

Sometimes, instead of winding normally, film assumes a bumpy irregular contour, and in extreme cases a given length of film may wind so unevenly that all of it cannot be held on a reel normally intended for that length of film, unless wound with excessive tension. This angular, uneven winding is simply another manifestation of curl when film contains insufficient moisture. Curl across the width of a film gives it longitudinal rigidity like that of a soda straw or a carpenter's "flexible" steel rule. Such articles are longitudinally inflexible, and if sufficient force is applied, they do not bend in one long curve but "break" sharply at definite points, separated by straight sections that remain unbent. Curled film behaves the same way, and the cause of angular winding is obvious.

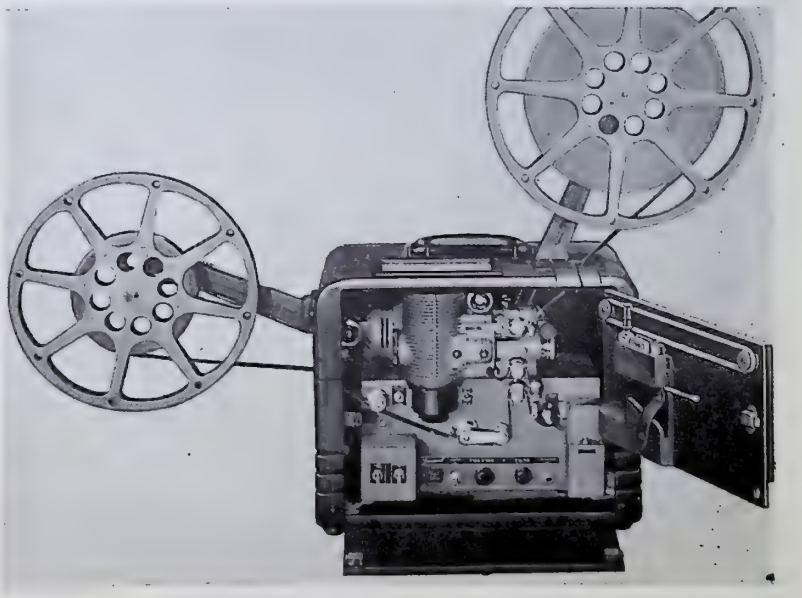
PRINT INSPECTION

When a film is returned after projection, it should be inspected, cleaned and re-humidified, if inspection indicates such treatment is required. Seriously damaged portions should be removed, or if damage is less severe, but like nicked perforations, the beginning of progressive deterioration, it should be recorded on a suitable card covering the life history of each print. Film inspectors should wear thin white cotton gloves to avoid finger marks on prints.

HUMIDIFICATION

With repeated use, film loses moisture from heat in projection, and condition of showing, whipping, or storing film may prevent its restoration. Exposed to cool, humid air, dry film takes up moisture and becomes flexible again, but the average library has no facilities for unwinding lengths of film so the entire emulsion surface is exposed to air for humidification. Storage of tightly wound film rolls in a humid atmosphere

PROJECTION IS THE MOST IMPORTANT OF FACTORS influencing the service life of 16-mm. prints. While equipment like this Bell and Howell Company Filmosound projector is designed to do its part, projectionists and all film handlers have important parts to play, too. And the film itself plays no small part in enjoying a long life. Considerations of the factors influencing service life—and how to achieve the maximum—are set forth in this article.



is ineffective for the edges take up moisture faster than the remaining emulsion surface, and uneven moisture content is conducive to buckling. A somewhat primitive, but fairly effective, method of re-humidifying dry film is to run it on a continuous projector in a properly humid atmosphere with the lamp turned off so there is no heat and the film moves continuously, repeatedly exposed to cool, moist air in passing through the projector.

CLEANING AND WAXING

There are machines that clean, wax or moisten film, but ordinarily neither these nor other elaborate film handling facilities are found in libraries.

In the absence of a special cleaning machine, during rewinding film may be passed through a folded pad of plush, moistened with carbon tetrachloride. As a precaution, there should be good ventilation or an exhaust fan, to remove carbon tetrachloride vapors, which cause serious illness if inhaled to excess, although with good ventilation there is little danger. Carbon tetrachloride should not contain impurities that might attach the image during long storage, if liquid is entrapped in the roll by rewinding so rapidly fluid cannot all evaporate from the film.

FILM DAMAGE FROM REWINDING

A frequent cause of film damage is improper or damaged equipment, or improper rewinding. If rewinders are not in alignment, an edge of the film will ride against one flange of the reel, causing wear, cuts, or nicks if the reel is damaged or bent, or if sharp edges or burrs remain after it has been stamped in manufacture. Such damage might be minimized if better quality reels were in universal use.

Assuming all rewinding equipment is in good order and properly aligned, another common source of film damage is cinching, when rewinding is started with a sudden jerk, or during rapid rewinding when the unwinding reel is stopped abruptly. Any sudden jerk during rewinding will tighten the roll so various convolutions of film slide against one another. If there are abraded surfaces or particles of dirt on film when it is cinched, they will scratch the film surfaces with which they come in contact.

FILM STORAGE

For good storage, film should have moisture content in equilibrium with air having relative humidity of 40 to 50 per cent at temperatures of 70 to 75 degrees Fahrenheit before it is placed in containers. If film is to be stored for a long time, it should be removed from metal reels, spooled on laboratory cores, and wrapped in chemically pure photographic wrapping paper, as used by manufacturers for packing unexposed film. When very long storage is intended, it is desirable to have moisture content in the film in equilibrium with air having relative humidity of 40 to 50 per cent, as before, but with lowering of temperature to 50 or 55 degrees Fahrenheit. Probably few libraries have such temperature control, but without it, film can be stored in a room at normal temperature, with relative humidity of 40 to 50 per cent, as suggested.

RENOVATION; SCRATCH REMOVAL

After a film has been in service for some time, it may show serious deterioration from scratches in the emulsion, the base, or both. Sometimes a worn print can be improved by a renovating or scratch-removal process, provided that scratches and abrasions are not too serious and perforations are not badly nicked or torn.

Commercially available scratch-removal processing is sometimes helpful in restoring valuable film. But scratch-removal is a cure. Since prevention is better than cure, it is better to minimize wear and tear by proper film handling at all times.

EDUCATION FOR PROJECTION

Libraries might cooperate to educate their customers and raise the level of 16-mm. projection. As with libraries circulating books, or any other rental organization, damage to property through willful ignorance or flagrant carelessness should be charged to those responsible, and provision of penalties might be a stimulus to film renters or projectionists who have no interest in careful treatment of prints.

Every film shipped from the cooperating libraries might carry a standard printed form with space for a statement of film condition, record of existing minor damage, and number of splices, copied from the print record file. A further paragraph, listing bad projection practices, could end with a warning. Of course, application of such a policy should be tempered with reason, since the prime objective is the education and cooperation of film renters.

FACTORS IN SHORT PRINT LIFE

The chief factors leading to shortening of service life of 16-mm. films may be listed as follows:

Laboratory—(1) Insufficient hardening; (2) too rapid drying; and (3) insufficient drying or over-drying of film.

Projection—(1) Projection of green film; (2) scratches from emulsion deposits and dirt; (3) abraded aperture plate; (4) stuck rollers; (5) pulled or torn perforations from improper threading; (6) cinching of film in rewinding; (7) use of improperly aligned rewinders, and cheap or damaged reels, causing edge nicks; (8) excessive heat in projection; (9) rapid rewinding before film cools; (10) continuous projection in a warm or dry atmosphere; (11) stopping continuous projectors without first turning off lamp so film and mechanism cool down; (12) improper storage of film between periods of projection.

Library—(1) Green film sent out when first received from the laboratory without proper aging; (2) failure to clean film when necessary; (3) failure to humidify film when necessary; (4) failure to detect film damage because of careless inspection; (5) improper splicing; (6) cinching during rewinding; (7) edge nicks from improperly aligned rewinders and cheap or damaged reels; (8) improper storage with excessive temperature and insufficient moisture.

LIST OF RECOMMENDED PRACTICES

Consideration of these factors leads to the following recommended practices, tabulated in "do" and "don't" form upon request for this as a list for convenient reference:

Practices to Be Followed in the Library

(1) Deal with reputable laboratories, since this is the best assurance of obtaining properly processed films.

(2) Store new films for a week or more before projection.

(3) Inspect prints upon their return to the library.

(4) Have inspectors wear white cotton gloves.

(5) Clean film at proper intervals. Be sure there is adequate ventilation if volatile cleaning fluids are used.

(6) Humidify films when necessary. This cannot be effected properly by merely storing a roll of film in a moist atmosphere.

(7) Make neat, strong, and proper splices.

(8) Rewind film carefully to avoid cinching.

(9) Be sure rewinders are properly aligned.

(10) Discard cheap or damaged reels that will scratch or nick film.

(11) Store film in atmosphere with relative humidity of 40 to 50 percent. Temperature should be maintained at 50 to 55 degrees Fahrenheit if possible.

(12) Allow an hour or more for roll of film removed from cool atmosphere to warm up to room temperature before projection. This prevents condensation of moisture that may cause sticking in projectors.

(13) Keep record of every print, listing its condition and any new damage or deterioration that occurs when out of library.

(14) Adopt policy of placing responsibility for damage and charges for replacement upon the film renter if the print suffers from projection or handling away from the library.

(15) Adopt reasonable standard for classification of print condition during service life, and a minimum standard after which films are discarded. These classifications might be standardized by a Committee appointed by co-operating film distributors.

List of Practices to be Avoided

(1) Do not project green film until a week or more after it is received from the laboratory.

(2) Do not store films upon their return without inspecting them.

(3) Do not fail to clean and humidify films when necessary.

(4) Do not fail to cut out damaged portions and faulty splices.

(5) Do not make splices that cannot serve as a quality standard for splices made by film renters.

(6) Do not rewind film at a rapid rate, with sudden acceleration or deceleration that will lead to cinching.

(7) Do not use rewinders if they are not perfectly aligned.

(8) Do not use cheap or damaged reels that will cut, nick, or scratch film.

Instruction Course for 16-mm. Operators

Outline for a Comprehensive Curriculum Based on the Army's Training Schedules

FOREWORD

The accompanying outline of a 16-mm. projectionists' training course is reprinted from the 1946 ANFA Year Book through the permission of Wilfred L. Knighton, executive secretary of the Allied Non-Theatrical Film Association, Inc., New York 16, N. Y. Organization is the national trade association of the 16-mm. motion-picture and equipment industry, formed in 1939 to promote and protect the interests of all identified with the industry in the furthering of the use of 16-mm. pictures for education, industrial training, entertainment, commercial, and all other practical purposes.

All persons, firms, and the like, who are in some way identified with the field of 16-mm. films and equipment, and visual education in general, are eligible for membership in ANFA, dedicated ". . . to disseminate useful information . . . to promote reforms in laws relating to the industry . . . to encourage the wider use of visual education . . . to promote the quality and increase quantity of worthy products . . . to elevate the standards of honor, integrity, courtesy, and fair dealing . . . in general to promote the business welfare of the members."

While addressed to projectionists in the 16-mm. field, the accompanying instruction outline might well be followed by original and refresher courses for operators of the standard 35-mm. equipment.

This article is based upon actual experience and the responsibilities for the supervision of the training and certifying of over one thousand 16-mm. projectionists on various equipments at Camp Hood, Texas.

Initially we should like to say that instruction in the actual operation of any sound projector is effective only if given to small groups at a time, not in excess of six or eight trainees, since each one learns chiefly by doing.

For this size group there should be three or four projectors available and the trainees should be paired on the basis of two to a machine.

Such prospective operators should be selected for training strictly on the basis of interest, reliability, and mechanical aptitude. They should thus be obtained on a volunteer basis and their previous background checked on the latter two requirements. This can be done through a simple questionnaire form.

Of the three requirements, interest is the most important, since without this quality the trainee will never develop into a proficient operator.

The three or four projectors are placed on separate stands about four or five feet apart, all faced in one direction and each having a separate screen or projection surface.

A jumbo photographic enlargement, or blowup, of the projector, in which the route of film travel is clearly shown and nomenclature of important projector parts indicated should be posted adjacent to the projectors and will thus serve as an effective training aid.

One trainee of each pair is given one step of instructions at a time while the other trainee observes. After the first trainee has mastered the respective step, he becomes the coach to the second trainee. Thus the coach-and-pupil method is used at each step of instruction.

In this way, a single instructor can handle up to eight trainees on four projectors.

A film such as Army Film Bulletin No. 73, entitled "Use of Training Films," is shown at the beginning of the course and serves as an excellent introduction.

It is generally found that three or four hours are required for instruction with another four hours spent in supervised practice. It is best to have the instruction period in the morning and the practice period in the afternoon.

At the conclusion of the course, the trainee is given a test. If he fails to secure a passing grade, he is required to return for further instruction until the operation has been fully mastered.

If the trainee attains a passing grade, he is turned over to his superior for approval. Upon the completion of three separate showings satisfactorily handled, his superior is required to certify to this effect and the certification thereafter entitles the trainee to a projectionist's certificate.

Trainees who claim previous projectionist experience can be easily screened with the aid of an operators' quiz and handled accordingly.

As a result of the foregoing course of instruction, approximately 20,000,000 feet of film were shown in 21 months with only 0.1 of 1 per cent of film damage requiring replacement.

One thing which should be avoided at all times is an excess of operators. Too many operators do not permit adequate practice. This results in poorly handled showings.

OUTLINE OF COURSE OF OPERATOR INSTRUCTION

1. EXPLANATION OF PRINCIPLES OF MOTION PICTURE PROJECTION.
   a. What makes movies move.
   b. What makes movies talk.
2. SETTING UP EQUIPMENT.
   a. Reel arms.
   b. Take-up belts.
   c. Electrical connections.
   d. Sound lead
3. EXPLANATION OF OPERATING CONTROLS.
   a. Tilt.
   b. Lamp switch.
   c. Amplifier switch.
   d. Volume control.
   e. Tone control.
   f. Speed control.
   g. Forward and reverse switch.
   h. Framing lever.
4. HANDLING AND LACING FILM.
   a. Importance of cleanliness.
   b. Care of reels.
   c. Lacing film into projector.
      (1) Study and comparison of operating diagram.
      (2) Engaging film in sprockets.
      (3) Continuous operation until mastery attained.
   d. Purpose and importance of loops.
   e. Protection and function of snubber roller.
   f. Safeguards against film damage.
      (1) Testing before starting.
      (2) Position of operator in relation to projector.
5. TEACHING IMAGE SIZES.
   a. Focusing.
   b. Relation of image size to distance.
   c. Brightness ratios.
   d. Relation of extraneous light to projection in monochrome and Kodachrome.
   e. Purpose and use of projection lenses of various focal lengths.
6. LOCATION AND CARE OF SCREENS.
   a. Ratio of screen size to room size.
   b. Angle of view and elevation.
   c. Precautions in handling beaded fabric.
7. TEACHING CORRECT SPEAKER PLACEMENT.
   a. Room size.
   b. Acoustics.
   c. Elevation.
   d. Sound absorption factors.
8. OPERATION AND PROJECTION (Practice films are used for this purpose until the operator acquires mastery; thereafter training films are used.)
   a. Order of operating procedure.
   b. Still picture projection.
   c. Reverse projection.
9. TROUBLE SHOOTING AND FIRST ECHELON MAINTENANCE.
   a. Locating and correcting cause for no screen image.
   b. Locating and correcting cause for no sound.

b. Locating and correcting cause for weak or poor sound.
d. Replacing projection globe.
e. Replacing exciter lamp.
f. Replacing take-up and rewind belts.
g. Replacing amplifier fuse.
These are the only points of maintenance serviced in emergency by operators. Operators are strictly forbidden to undertake any further repairs or adjustments.

10. TESTING
a. Projectionist's written quiz (see below).
b. Further instruction on any weaknesses disclosed by quiz.

TRAINING PERIOD.

1. Individual instruction..four hours
2. Supervised operation...four hours
Individual instruction is interspersed with supervised operation, step by step.
The above is the average time devoted to instruction and practice. Individual differences determine actual time allotment.

11. MOTION PICTURE PROJECTIONISTS' QUIZ (with correct answers).

1. Give two reasons why projector will not operate when switch is turned on.
Answer: 1. Power cord disconnected.
2. Main fuse blown (Main line fuse).

2. Give two reasons why exciter lamp fails to light when amplifier switch is turned on.
Answer: 1. Lamp burned out.
2. Exciter switch not turned on.

3. Give three reasons why no sound is forthcoming when exciter lamp is turned on.
Answer: 1. Speaker disconnected.
2. Photo-electric cell set too low.
3. Sound lens not fully seated.

4. Give four reasons for insufficient (weak) sound.
Answer: 1: Speaker cover not removed.
2. Dirty sound lens.
3. Photo-electric cell control set too low.
4. Darkened (old) exciter lamp.

5. Give three causes for distorted sound quality.
Answer: 1. Sound-silent switch set at silent speed.
2. Photo-electric cell set too high.
3. Dirty, worn or scratched sound truck on film.

6. Give three causes for no picture on the screen when operating lever is raised and switches are turned on.
Answer: 1. Projection lamp burned burned out.
2. Lens obstructed (as in Model 25).
3. Lamp cable disconnected.

7. How far from screen should projector be set to fill a 52 x 72-inch screen when using the standard 2-inch projection lens?
Answer: 32 feet.

8. In what order should the following switches be turned on when starting projection?
Answer: 2, Motor; 1, Amplifier Volume; 3, Light.

9. In what order should the following switches be turned off when projection is finished?
Answer: 3, Motor; 2, Amplifier Volume; 1, Light.

10. Give three causes for loss of top film loop.
Answer: 1. Torn sprocket holes in film.
2. Bent supply reel.
3. Top film shoe not closed —or set too loose.

11. Give two causes for loss of bottom film loop.
Answer: 1. Torn sprocket holes in film.
2. Film not threaded properly at gate.

12. Give three causes for loss of loop behind lens.
Answer: 1. Film not properly engaged in teeth of front sound roller.
2. Bottom film shoe not closed.
3. Torn sprocket holes in film.

13. Give three causes for unsteady picture.
Answer: 1. Projector on shaky table.
2. Film too dry (shrunken).
3. Sprocket holes chipped.

14. Give five reasons for dim picture on screen.
Answer: 1. Still picture lever "up."
2. Dirty lens or optical system.
3. Poor screen.
4. Projection lamp darkened by too long use.
5. Room not properly darkened.
Count each of the above questions as 6 points.

15. TRUE-FALSE TEST (with correct answers).

False—The projector is put into reverse when it is desired to rewind a picture.
False—Sound will continue to be reproduced from the sound track even though the exciter lamp is burned out.
True—Film should always be handled by the edges.
False—Film should always be rewound after the last showing.
True—Film damage is usually the fault of the operator rather than the projector.
False—The speaker should be placed on the floor for best sound quality.
False—It is unnecessary to clean the gate and other film travel surfaces oftener than once each week.
False—There are five oiling points which should be oiled liberally once a month.

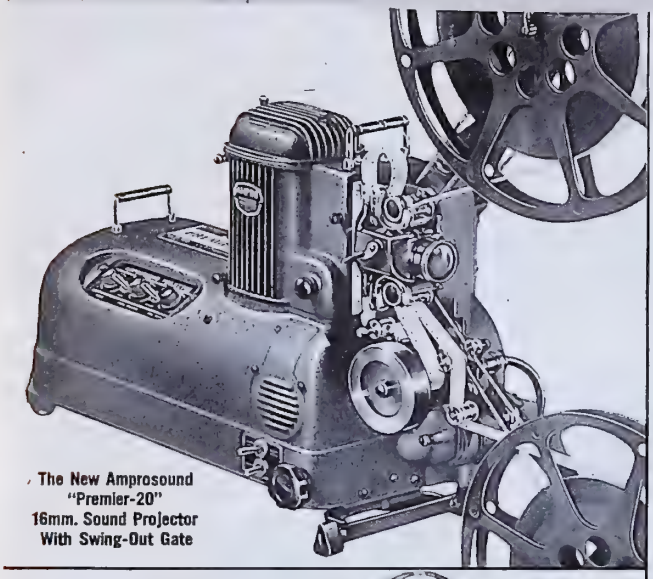
Count each True-False Question as 2 points.

A score of 75 points is considered satisfactory.

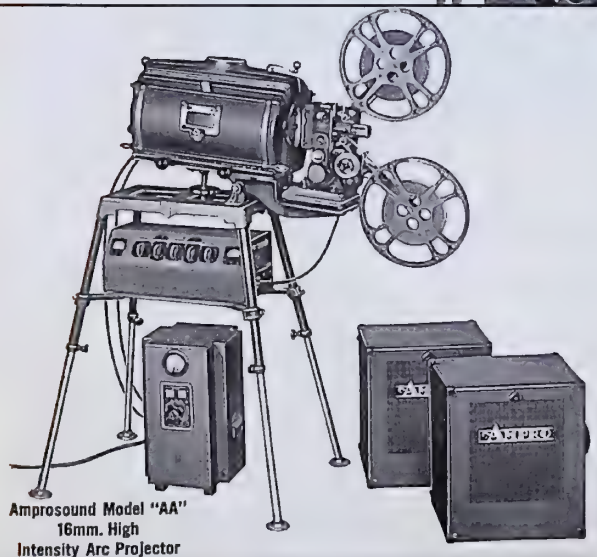
AFTER TRAINING, the Armed Services used 16-mm. projectionists in a wide variety of locales. This Mobile Movie Unit of the Special Service Section uses a darkened Nissen hut for a theatre when showing latest American motion pictures to an audience of soldiers, nurses, and patients at an American hospital in Britain. Such projectionists as these were trained under a schedule such as is set forth in this article. (Photo courtesy of the Signal Corps.)

AMPRO

PRECISION CINÉ EQUIPMENT



The New Amprosound "Premier-20" 16mm. Sound Projector With Swing-Out Gate



Amprosound Model "AA" 16mm. High Intensity Arc Projector

Ampro Brings New Standards of Quality to 16 mm. Projection

The vast fund of experience—more than a decade of pre-war "know-how"—enables Ampro to build precision 16mm. projectors which set new high standards of sound projection. Top engineering and production skill create 16mm. equipment which operates continuously and efficiently—even under adverse conditions.

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Amprosound Model "AA" 16 mm. High Intensity Arc Projector

A compact 16 mm. arc unit with sufficient illumination to handle the largest audiences. Available as dual equipment with change-over device for continuous showings.

Features include automatic fire shutter... triple-claw movement for film protection...ample cooling ...centralized lubrication..."Junior High" high intensity arc lamp...3-inch F.2 projection lens...direct light path from exciter lamp to photo-electric cell ...plus other features which make Ampro 16mm. Arc Projectors the leaders in their price class.

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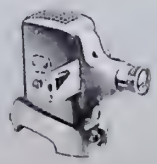
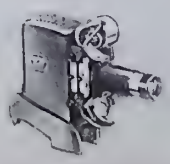


AMPRO 2" x 2" SLIDE PROJECTOR —with automatic snap-action, self-centering slide changer



AMPRO DUAL SLIDE PROJECTOR— for projection of strip film as well as glass or redimount slides

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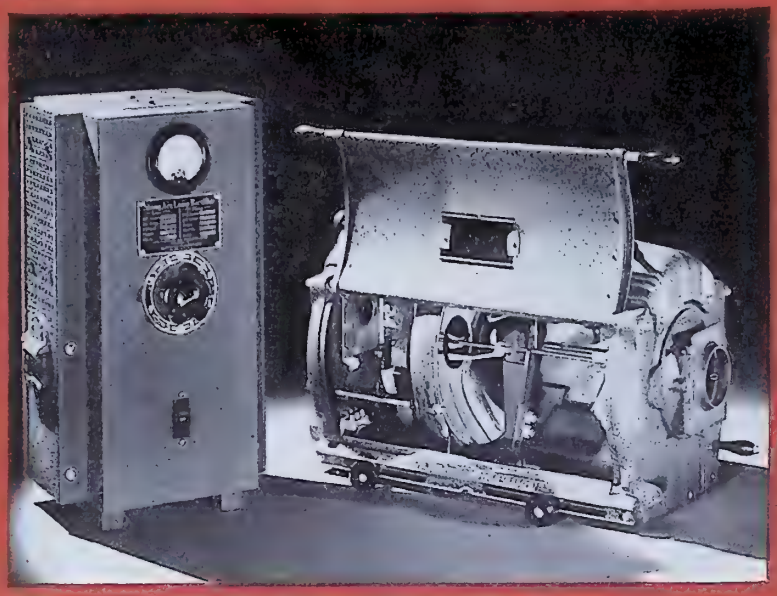

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